TECHNOLOGY

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April 1959

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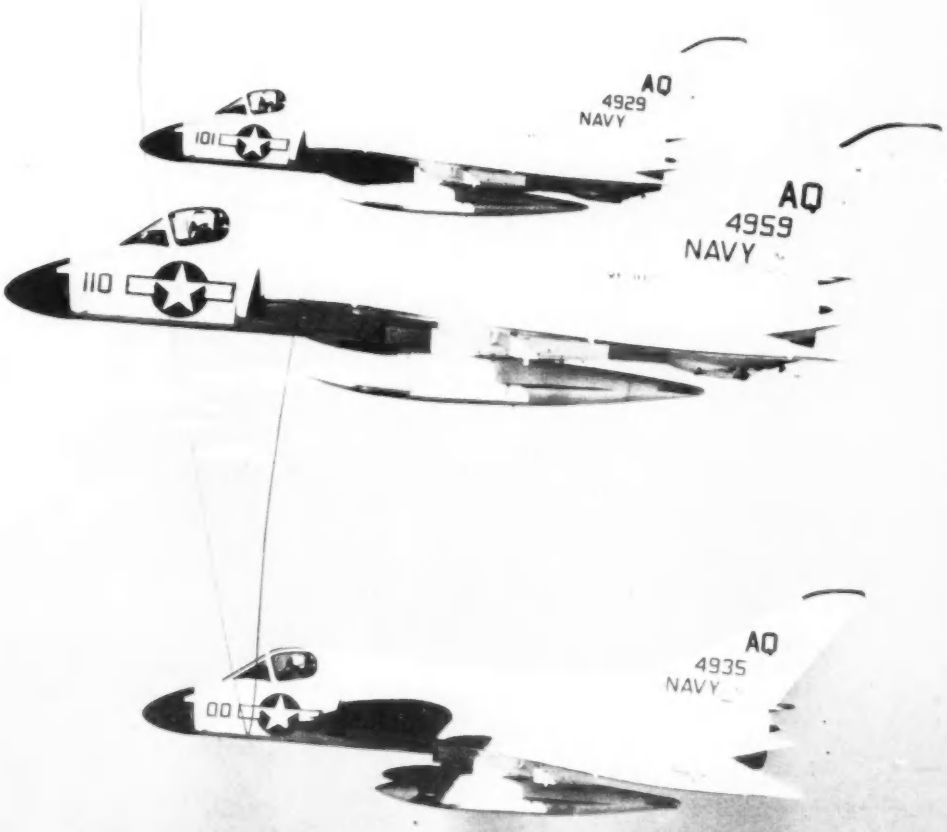
V4 #10

NAVAER 00-75-510

THE NAVAL AVIATION SAFETY REVIEW



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READY FOR A RUMBLE . . .

The Navy's air might cruises far and wide through its domain in order to protect the domain below — the sea from whence it was launched.

Focused here are the intense training of many months, the major efforts of many manufacturers, and the combined taxes of many citizens. This is why you learned to fly, and why your F4D was built — to protect. To do so it carries aloft a brace of cannon and oftentimes rockets where they can be used for a deadly purpose.

But, today you are training for your tactical mission — training for your deadly, protective role. Get the most out of each flight, so that each hour contributes the maximum to the nation's combat-readiness.

Letters 1
Spinning 3
Anymouse 10
Whiz Quiz 15
Truth and Consequences 16
Keep the Pressure On 20
Wet Dry Run 22
O-Club Saturday Night 24
Flight Quarters for the Flight Surgeon 26
Notes from Your Flight Surgeon 28
Spark Plug Trouble 30
From the Ground Up 34
Murphy's Law 38
Clipboard 40

Published by U.S. Naval Aviation Safety Center
NAS, Norfolk 11, Va.

RADM William O. Burch, Jr.
Commander, Naval Aviation Safety Center

CDR Herman Evans, Jr.
Head, Literature Department

Editor, A. B. Young, Jr. **Managing Editor,** LCDR W. J. Thomas
Art Director, R. B. Trotter
Associate Editors: LCDR J. M. Wondergem; LT W. B. Kennedy; J. T. LeBarron, JOC; J. C. Kiriluk, Julia Bristow
Production: C. A. Coe, JO2, **Photographer:** J. E. Williams, Ph 1

VOLUME 4
NUMBER 10

Purposes and Policies: APPROACH is published monthly and contains the most accurate information currently available on the subject of aviation accident prevention. Contents should not be construed as regulations, orders, or directives. Material extracted from Aircraft Accident Reports, (OpNav 3750-1), Aircraft FLIGA Report (3750-10), Medical Officer's Reports (OpNav 3750-8) and Anymouse (anonymous) Reports may not be construed as incriminating under Art. 31, USMJ. Photos: Official Navy or as credited.

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Correspondence: Contributions are welcome as are comments and criticisms. Views expressed in guest written articles are not necessarily those of the Naval Aviation Safety Center.

Printing: Printing of this publication approved by the Director of the Bureau of the Budget, 31 Dec. 1957.

Subscriptions: Single copy 30 cents; 1-year subscription $3.25; 75 cents additional for foreign mailing. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Library of Congress Catalog No. 57-60020.

LETTERS

LETTERS

Letters

Red Fitting

Sir:

We are having a little multi-color trouble concerning our MC-3A fitting on the oxygen mask. SCB 29-57 states that they should be either a green or red color. However, we have two red colors, a deep wine red and a light red. The light red one has the name SIERRA and five numbers, 224-25, stamped on it. The dark red one has no markings. Are they both good or is just the bright red one OK? We are also having trouble getting the white gasket for the MC-3A connector.

C. P. ANDERSON
LT, USNR
ATU-213

● BACSEB 29-57 does not state the green (ERIE) connector can be used. The green connector should be discarded and replaced by either the dark red or light red connector. When you exchange one of the older type connectors for this dark red or light red MC-3A connector (Ref: BACSEB 29-57), you must remove the white rubber gasket and install it on your new MC-3A connector. You cannot use the black rubber gasket on the MC-3A.

Passenger Briefing

Sir:

Although I am an officer of the Supply Corps, from time to time I have been required to participate in frequent aerial flights to carry out various assignments.

Just recently, I had occasion to go on emergency leave, and luckily secured a seat on a flight of a multi-engine Navy aircraft to a Naval Air Station quite near my destination. Before or during the flight, neither I nor any of the other passengers were briefed in the use of parachutes or harnesses, bail-out procedures or any emergency instructions other than fastening the safety belt and obeying the "No Smoking" signs. I have flown numerous times in Navy aircraft of several types, for the past 10 years, and have not yet, unless I asked, been briefed on use of survival or emergency equipment, or on bailout procedures.

On my return trip, I secured a flight aboard an Air Force C-119. I was required to be on board 20 minutes prior to takeoff, and once aboard was required to put on and adjust my parachute and harness with a thorough briefing concerning its use and on bailout procedures, which included a test ringing of the bailout bell and how to get out of the aircraft. This first briefing was carried out by the crew chief, and upon arrival of the pilot, the entire briefing was quickly gone over again prior to starting the engines. This was my first flight with the Air Force, and I must admit that I was greatly impressed with their Flight Safety Campaign.

FLYING "PORK CHOP"

● The Navy pilot has an equal responsibility for the safety of his passengers. See OpNav Inst. 3710.7A, Section VI, para. 3.

Break Out

Sir:

There have been many cases in the past where pilots have been trapped in their planes and failed to escape because of lack of "canopy opening knowhow." ATU-213 safety officers, in order to show their instructors and students that you can get out, took advantage of an opportunity and made good use of the back portion of a surveyed F9F-8T canopy to prove the point. The subject of the demonstration by the ATU-213 assistant safety officer was: How to use a "canopy opener" in four easy lessons: 1) after about nine quick jabs with the "opener" (a standard Navy knife) the canopy cracks; 2) a follow-up blow with the knife knocks out a big hunk of plexiglass; 3) the pilot eases through the opening and 4) is free to leave the aircraft. Hacking time: 28 seconds.

ATU-213
NAAS Chase Field

● Thanks for the timely letter. For an actual case of a pilot hacking his way to safety see "From Tree to Shining Sea," page 27. If you try this for training, or for real, remember to lower your helmet visor to protect your eyes.

"I Object"

Sir:

How does it feel to become a target? This is a question CDR Paul F. Stevens may be able to answer shortly, as his article entitled, "I OBJECT," should get a few dozen responses.

Like check-off lists, it seems that no two pilots agree as to the best procedure. I'd like to begin with points "in agreement" and finally come to the defense of the "How I Land" articles.

The key to consistently good, safe landings is certainly the partial-power, glide-path type of approach, with emphasis on nose position (airspeed) and smooth throttle adjustment (small, timely corrections). I agree 100 per cent that the plane should be flown right down to the numbers, but I don't see how all types of aircraft can be flown to actual touchdown at a s i n g l e, constant, safe airspeed without landing on the nosewheel, or without jeopardizing single-

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U.S. Naval Aviation Safety Center.

Continued from preceding page

engine performance and wave-off capabilities (assuming flaps full down).

For safety's sake certainly it is prudent to hold more airspeed downwind, in turns to base, and final than the minimum approach airspeed required to obtain the slight nosewheel-up landing attitude on a P2V, for example — unless the approach is really dragged out, good and flat, with quite a bit of power all the way around. Landing on nosewheels is usually frowned upon with the P2V model aircraft at least. I am not really familiar enough with the A3D to compare it with the P2V, but I do know that in the case of the latter, much has been said against touching down nosewheel first.

The throttle setting in turn depends upon the rate of descent, which is a function of the gross weight and wind encountered on the glide path. To illustrate this point, try a downwind GCA.

Ideally, a safe approach speed includes consideration of a possible single engine, a missed approach, or wave-off. Each plane has its own peculiarities and these differences generate the "How I Land" advisories. Generally speaking, a safe approach speed should be one permitting adequate recovery from single engine at low approach altitude.

Selection of airspeed for a particular condition is the most important consideration. This is done by positioning of the nose, then power is adjusted to follow the desired flight pattern.

R. J. CASTEN
LCDR, USN

Sir:

Re: the December 1958 article in APPROACH entitled "I Object!" by CDR Paul F. Stevens.

I think the article is a good one, and his opening comments are correct. There have been some pretty sorry articles on the subject, one of which might have been mine.

I don't know whether or not he had me in mind . . . if he did, I'm always ready to learn something new. If there's a better way of doing it, I'm his boy. I believe, however, that he is referring mainly to articles that have been written for Navy consumption. That is—how do you do it for carrier-type operation?

My main interest in how to approach and land an airplane has been Air Force fighter types. Now, actually, there isn't much difference today between AF and Navy aircraft in this respect. In fact, there never really has been. The big difference, as I see it, is this: Traditionally, the AF has been making their approach and landings from what is called a 360-degree overhead tactical approach. That is, a screaming initial, followed by a violent break into downwind that would generally cause a blackout, chop the throttle into idle and put her on the deck without further ado.

Well, this method worked for a few of the sharper lads and was more fun to watch than the mild

easy-going type. Besides that, sometimes it got downright exciting, especially when some poor soul fell short, overshot, or spun in from an accelerated stall at the break or base leg.

On the other hand, the Navy has traditionally made a carrier type approach. You recognized early in the game that in order to put an aircraft on a carrier deck, more intelligence had to be added to the mechanics besides that which is produced in a cockpit. Of course, I'm referring to the LSO. The AF never considered the advantages of an LSO for the approach and landings — long runways, you know. Actually, an LSO would have saved them money through the years.

It may be interesting to learn that I have gone you Navy folks one better — I recommended a 2½° glide slope for the F-104, or, in other words, 300 feet at 6000 feet out from the threshold. Of course we don't have to worry about the hook banging the ramp when making the flatter approach.

Looking at this thing realistically, I'm not real fussy about the angle of approach so long as it is generally flat — 2, 3 or 4 degrees is okay. The main purpose is to reduce that hellish high sink rate which the steeper approaches produce. As for the airspeed versus the angle-of-attack indicator, I have been crusading for angle of attack for years and years. In fact, I have called the airspeed indicator one of the most misleading instruments we have in the cockpit —and the damn thing is generally considered the most important during approach and landing. I say: "Humbug!"

Now to sum up what I have been trying to say: Generally I have endorsed the Navy carrier type of approach and landings. On numerous occasions I have even recommended to the AF that they should adopt the principles of your system. Naturally I got opposition to such outlandish remarks — in fact, I even lost a few friends. I stuck to my guns nevertheless, and although most of the people in the AF bought my concept to approach and landings, they would never admit it was anything like that which the Navy used.

A. W. (Tony) LeVIER
Director of Flying Operations
Lockheed Aircraft Corp.

Sir:

Reference "I Object." Objection sustained! !

I have used the described method of flying the approach in the F11F, F8U-3, F102 and F-106. For Air Force types, the airplane must be flared just prior to touchdown to prevent exceeding the landing gear structural limits; other than that, the method is sound and if generally adopted would go a long way toward alleviating the landing accident problem. The aids such as the mirror landing system and angle-of-attack indicator make the described technique nearly idiot proof.

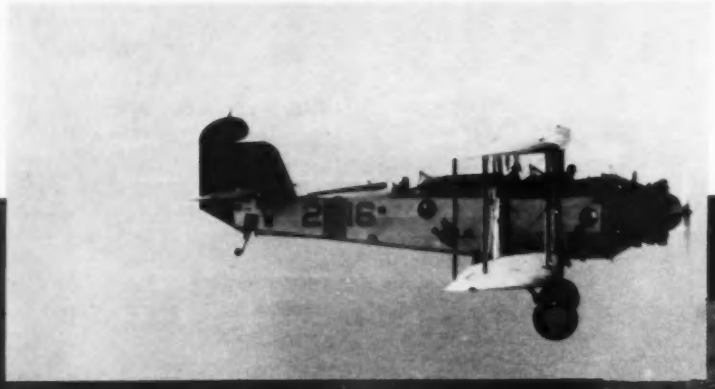
C. E. MYERS, JR.
LT, USNR (Inactive)
Engineering Test Pilot
Convair

SPINNING:

New words on an old subject

by *Commander Don Engen . . .*

Continued



For many years the tail spin was marked by the wire-shrilling descent of the biplane, such as this TG-1 above. Progress was accompanied by the F7U's weird "spin" which was labeled "post-stall gyration."

PILOTS have been spinning airplanes since shortly after Orville Wright first took to the blue at Kitty Hawk. Prior to about 1916, the spin usually ended fatally. This was primarily because the recovery controls required were unnatural to what the pilot felt was required. He was diving toward the ground and back stick was all that he knew would prevent his descent.

Around 1916 it was discovered that forward stick and opposite rudder were effective for recovery and spin fatalities decreased. The spin became an ordinary maneuver. As soon as the first pilot used a spin as a defensive maneuver in WWI and his opponent watched in satisfaction only to see him recover, it lost all tactical use forever. (This writer, after having conducted spins in many types of airplanes and after chasing spin demonstrations, would like nothing better than to see an opponent in a spin and would be waiting for him at the bottom.)

About 1919, the airplane design theory having changed, spins again began to take their toll of pilots. The flat spin was encountered and the hitherto effective recovery controls would not suffice. This flat spin had a high rotation rate, as high as 1 turn per second, and an attitude of within 10 to 20 degrees of the horizon. Research provided reasons for this spin and it was endeavored to design the flat spin out of a new airplane by increasing the vertical tail area. This was not totally effective.

Pilots continued to spin airplanes intentionally and unintentionally during the 1920's and 1930's and during this period recovery techniques varied little. Opposite rudder, forward or neutral stick, and neutral ailerons proved the optimum technique. The WW II years produced rapid airplane design improvement. However, the same recovery techniques continued to be applicable. Increased engine power was destabilizing and retarding the throttle for spin recovery was required.

With the advent of the jet engine and the thinning of wings for decreased drag, more and more weight (mass) had to be concentrated in the fuselage. By 1953 it was readily apparent to all pilots that the spin had once again taken on new modes and that past recovery procedures were not obtaining the desired results. The spin was becoming violent and oscillatory about all three axes and in addition to the known classical spins now horizontal gyrations occurred. These latter were first encountered on tailess airplanes and in NACA high speed research airplanes. As a result of NACA (now NASA), industry and military efforts new recovery techniques were established and preventives in the form of control restrictions were used.

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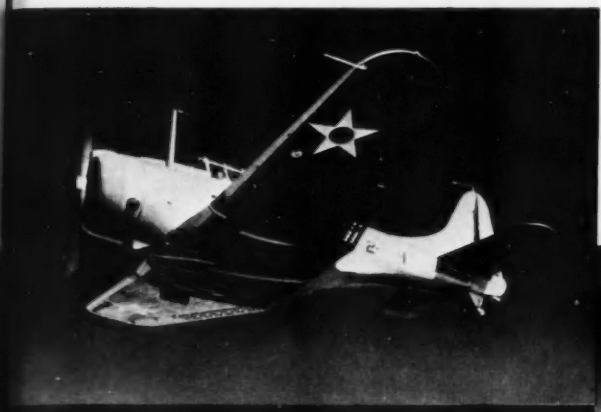

Still applicable as the monoplane became dominant, the NACA spin recovery technique lasted through World War II and into the early jet age. Advanced jets brought a need for modified recovery method.

It is in this spin era that we find ourselves today. We know how to recover most airplanes from spins. There are some configurations of airplanes that are extremely difficult and sometimes impossible to recover from spins. *This article does not attempt to promulgate the final all-encompassing and last word on spins. The intent here is to supplement the Flight Manual with general background information and to discuss the spin as it is known today.* General recommendations will be made that apply to most present day airplanes.

It is hoped that through this article the reader will be able to overcome any stigma of doubt or fear that he might have had, if any, and instead understand the maneuver and respect it.

There have been some 50 proven spin accidents within the last two years, with 25 fatalities. While it might be said that the inadvertent spin need never occur if the pilot flies his airplane and heeds the aerodynamic or artificial warnings designed into it, we've always had inadvertent spins, and we expect to continue to have some because of certain practical and tactical military requirements.

For example, any time a pilot has a hung missile or dummy shape on an over the shoulder delivery chances are pretty good that he will spin out. Certain tactical maneuvers that require a zoom climb to above service ceiling also are susceptible.

Related Factors

It is not intended to discuss in detail all of the factors that affect a spin. The following facts are stated in brief. The character of a spin entered at 45,000 feet does not differ greatly from one entered at 25,000 feet. However, the equivalent airspeed at which a spin is entered does affect the violence of the spin and spins entered at high equivalent airspeeds feel more violent to the pilot. As the center of gravity of an airplane moves aft the static longitudinal stability decreases and the tendency to pitch up increases. Directional stability deteriorates as the stall is approached, and as the airplane stalls the yawing moment required to initiate a spin may be imparted, though it is not necessary to stall to have this happen. It should be noted also that the exact stall in most high performance airplanes is sometimes hard to define. The airplane is more prone to enter the spin and the rotation rate will be higher in this flatter spin. The airplane will recover with greater difficulty from a flat spin.

With the advent of in-flight refueling higher gross weights are obtainable at altitude. High angles of attack are required to maintain the re-

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quired lift at these gross weights and the heavy airplane may spin. More energy is acquired in a heavy gross weight spin and a spin of this type will be more difficult to recover from.

It is axiomatic that safety is gained in spinning airplanes at altitudes sufficient to allow complete recovery by 10,000 feet.

Contrary to popular belief, sweptwings differ little from straight wings in aerodynamic effect on an airplane in a spin. The F104 has similar pitch-up characteristics to several swept-wing airplanes. As airplanes have progressed through the years the trend has been to concentrate more mass along the longitudinal axis. Fuel, landing gear, electronic equipment, and heavier jet engines are now concentrated in the fuselage. This fact has a pronounced effect upon the inertial qualities of an airplane in a spin and the recovery procedures.

The Incipient Phase

There are three phases to most spins. These are the incipient phase, the spin, and the recovery. All airplanes do not have the incipient phase and some airplanes will not spin. Chance Vought coined the term "post-stall gyration" for the F7U-3.

This airplane never entered a classic erect spin but rather tumbled about all three axes. The motion of the F7U-3 in the post-stall gyration might be considered to be like the incipient phase of a spin. The incipient phase is defined as that transient motion of the airplane between the stall and the fully developed spin.

As the airplane passes through the stall angle-of-attack the flow of air over the control surfaces breaks down and static stability rapidly decreases. After the stall the control surfaces are essentially ineffective and the airplane will pitch about any one or all of the three axes.

During this incipient phase of the spin the pilot will be subjected to varying vertical, lateral, and horizontal load factors. It may be possible for the pilot to recover from this phase. However, abrupt control deflections, either the prescribed spin recovery controls or abrupt control deflections to counter the motion of the airplane, probably will cause the airplane to enter the fully developed spin.

Generally speaking, if the pilot can detect the incipient phase he should release the force on the control that most likely caused the incipient motion and neutralize the other controls and let the airplane fly itself out. Caution must be exercised to not mechanically throw in spin recovery controls.

In most aircraft the incipient phase, if the pilot can detect it, may last from .2 to 10 seconds and ¼ to 3 turns of what may progress into a fully developed spin. Motions that can occur during this phase are snap-rolls, high yaw rates, pitch-up or any combination of these. If neutralizing the controls does not bring about the desired results and the fully developed spin results it is wise to allow the spin to steady down before recovery is attempted; recovery action cannot be taken until the maneuver is analyzed.

The Spin

The fully developed spin has been defined as a motion in which an airplane in flight at some angle of attack above the stall descends towards the earth while rotating about the vertical axis. The angle of attack of the airplane greatly affects the type of spin since the static stability varies from positive at low angles of attack to negative for high angles of attack. It must be remembered that the angle of attack is measured from the relative wind to the wing chord line. An angle of attack of 80 degrees can be had in a spin where the attitude is relatively flat in relation to the horizon.

Angles of attack beyond the stall but less than 60 degrees are considered to be low angles of attack and any angle above 60 degrees is considered to be a high angle of attack in spins. Most airplanes will average 45 degrees in the spin. When the spin is fully developed the airplane is at its highest angle of attack with a high rotation rate. If the average angle of attack is decreasing in the spin the airplane is tending to recover. The angle-of-attack indicator, as installed in current airplanes, will be of no help in determining whether a spin is a high or low angle-of-attack spin. It is not installed to indicate this information.

The first turn of a spin can be violent in nature if it is entered at a high equivalent airpseed. The airplane may pitch to a higher angle of attack, oscillate in roll, and/or yaw violently. The second and subsequent turns usually tend to steady down to a continuous oscillatory motion that is characteristic for each airplane design. In the spin the pilot will be thrown left or right. In a spin oscillating in roll and yaw he will not necessarily be continually forced toward the outside of the spin. Normal load factor will vary with the type of spin. The accelerometer will indicate positive values for erect spins and negative values for inverted spins. In many past spins the accelerometer has been the only available visual reference to determine the type of spin. *The pilot must school himself to rely on the turn-and-bank indicator and accelerometer to determine direction and type spin he is in.*

The Recovery

The recovery is that phase of the spin from the time recovery controls are initiated until controlled

The author—Commander Don Engen has participated in several spin programs on service aircraft and has flown somewhere around 100 different models. He is a graduate of UCLA and of the Empire Test Pilot School at Farnborough. His past service includes a tour in Bombing NINETEEN and in four VF squadrons. At present CDR Engen is assistant Head of the Carrier Branch, Flight Test Division, NATC.

flight is obtained. Each airplane differs in this phase as they do in other phases. Some speed up in rotation rate immediately after recovery controls are applied, others slow up immediately, still others continue in the same manner of spin up to three turns and then recover.

As much as 12 seconds of recovery control has been required on some models before some indication is had that the airplane is going to recover. That is a long time and it is eternally long to the pilot in the spin. Normally some indication of recovery is given the pilot in 3-6 seconds. The pilot must continually analyze his position and not panic in this crucial phase. Allow the airplane to respond to the prescribed recovery controls and then fly it out. There are of course models which recover in less than one turn.

The rate of descent in a spin varies widely and the pilot will probably have to use at least 8,000 to 12,000 feet in the recovery phase. All pilots should have an altitude fixed in their minds below which they will leave the airplane. A good rule-of-thumb for current airplanes is to at least be in a diving attitude in controlled flight when passing 10,000 feet above the ground or abandon all attempts to recover and leave the airplane.

Because of the high inertial forces present in the spinning of current airplanes, as discussed previously, the controls used for recovery vary somewhat. The F11F and F9F-8 have spoilers, rudder and elevator. The F8U and A4D have ailerons, rudder and elevator. The F4D has elevons and rudder. The F4H, F3H and A3D-2 have spoilers, ailerons, elevator and rudder. Because of the ineffectiveness of the rudder primarily due to turbulent airflow, another control was needed to aid in recovery. Ailerons were found to offer large enough values of yaw on some aircraft to appreciably aid in recovery. Spoilers have not been found to be effective for recovery from erect spins; they are effective in inverted spins.

The primary use of the elevator is to prevent the airplane from entering an inverted spin from an erect spin and vice versa. The rudder should be used judiciously in the recovery to prevent a continuing spin in the opposite direction. In some airplanes the rudder must be neutralized as soon as the turn needle comes off the stops to prevent this. *Each airplane has carefully determined recovery procedures. The pilot must know the proper recovery procedures for the airplane he is flying. His life depends on it.*

Erect Spin

The three phases are found in the erect and inverted spins. The erect spin is one that is evidenced by positive normal load factors. Since the pilot is now located farther from the center of gravity, he may be subjected to greater longitudinal forces. These forces generally will not exceed 2 to 2.5g. The spin is oscillatory in nature for all current fighters. Generally from 2000 to 4000 feet may be lost in each turn, and the rate of rotation will generally be 3-5 seconds per turn.

Inverted Spin

The inverted spin is defined as a maneuver in which an airplane descends towards the earth while rotating with an angular velocity about a vertical axis with a negative load factor and with a negative angle of attack which is greater than that at which the inverted stall occurs. As stated before, many times *the pilot's only means of telling whether a spin is erect or inverted is by his accelerometer.* There are as many modes to an inverted spin as there are to an erect spin. The airplane may not remain on its back but may roll through 360 degrees during one or several turns. This makes it difficult for the pilot to analyze the spin correctly. The nose of the airplane may remain above the horizon during the entire spin or it may alternate between steeply nose down and up. An inverted spin of this latter type will have high transient negative g and appear to be much "rougher" to the pilot.

In our current aircraft the inverted spins may be oscillatory about all three axes. The pilot is subjected to forces from 0 to —3.5g. It is difficult but possible for the inexperienced spin pilot to overcome these forces and apply the correct controls for recovery. He will most probably not be aware of the high forces exerted on him until the day

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after the spin when he will become aware of body soreness from lap belt and shoulder harness restraint. On occasion military and contractor pilots conducting spin programs have broken small blood vessels in these body areas and have had extremely bloodshot eyes for periods up to a week. These have disappeared and no apparent permanent injury or disfigurement has resulted.

High energy spins (continuous high rate of rotation) are more difficult to recover from. It is generally easier to recover from spins that hesitate during each turn. If recovery is is initiated just before or during one of these hesitations recovery will probably occur sooner.

Roll Divergence

An article on spins would not be complete without discussing roll divergence, or yaw coupling, which can result in a wild and destructive ride. The term "horizontal spin" for this maneuver is a misnomer. Most current airplanes have roll restrictions placed on them, limiting them to 180 degrees to 360 degrees of roll and certain aileron deflections at high equivalent airspeeds. This restriction is probably one of the most important to the military pilot. It is a restriction on his ability to maneuver his airplane tactically but one that must be adhered to.

The placement of the mass of the airplane closer to the longitudinal axis has increased the inertias in yaw and pitch creating undesirable moments. To the pilot who exceeds the roll restrictions for his airplane, it will become apparent that the airplane will accelerate in roll rate coupled with yaw and if continued—pitch. At some point this will become divergent and the pilot may be on a wild destructive ride from which he will be lucky to escape. Roll divergence can be encountered at high equivalent airspeeds and mach numbers after exceeding the allowable rate of roll. Restriction in angle of bank is expressed in the flight manual since angle of bank is more easily judged than rate of roll. If the placarded angle of bank is exceeded while at a high rate of roll, it allows the pitch and yaw moments time to produce divergence.

Unfortunately as most airplanes accelerate in speed they *appear* to become more directionally stable. The airplane will feel directionally stiff to the pilot and lull him into a false sense of security. The rudder becomes less effective when flying at high mach numbers and when directional stability rapidly deteriorates roll divergence can develop and the rudder is not effective to stop the roll. The elevator may not bring about the desired effect because the airplane may have pitched beyond the angle of attack for controlled flight. The experienced or inexperienced pilot when confronted with roll divergence may apply the wrong recovery control, as the pre-1916 spin pilot did, and aggravate the situation.

The primary actions that may possibly alleviate the situation are to neutralize all controls and reduce speed, but engine considerations dictate that if in MRT the engine remain there to prevent some awesome and rapid compressor stalls possibly resulting in a flameout or damage to the inlet ducts. Speedbrakes are most effective for this if in MRT, and if in CRT return to MRT immediately with simultaneous use of speedbrakes. The controls should be returned to NEUTRAL. The idea is to slow up and back out of an area that is destructive and death dealing. The primary preventive is to *never* exceed the roll limitations on the airplane that you are flying at high equivalent airspeeds or mach numbers.

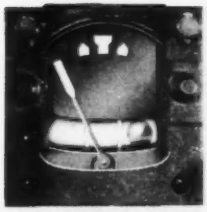
Ed. Note: "Roll Rate Restrictions," a 10-minute, low cost film which discusses roll divergence was produced by NASC and distributed to the Fleet since July 1958. Copies are very limited at present but action has been taken that promises to place the film in all Navy film libraries in the near future.

Psychological and Physiological Aspects

Spins are demonstrated in most Navy airplanes by contractor pilots in order that proper spin recovery techniques will be determined. It is one thing to spin an airplane intentionally and a completely different thing when an inadvertent spin develops. During intentional spins the pilot is keyed up and is aware of or suspects the modes of motion that will result. If he is a contractor pilot commencing a new spin program he has a great amount of engineering data available and conducts his program in a build up manner and as he progresses he amasses means of combating physiological factors and overcomes the psychological. This is not without risk but he is prepared, as well as can be expected (including spin chutes), for the ensuing spin. By the time the demonstration is undertaken he is accomplished in recovery techniques.

The pilot throw into an inadvertent spin is generally immediately disoriented. The immediate surge of adrenalin following an uncontrolled maneuver is followed by a moment or moments of disorientation dependent upon the nature and the violence of the motion. In this period the pilot must reorient his thinking from his just past and intended attitude and flight path to analyze the ensuing incipient spin or spins.

The spin is not a maneuver to be feared. It is to be respected. Most tactical military airplanes are spin demonstrated and spin recovery techniques should be well known. Many pilots have conducted spins, intentional and inadvertent, and pilots will continue to spin airplanes with successful recovery. The following comments may sound awe inspiring



Turn & Bank

Orientation is difficult at times without reference to this instrument — showing a spin to the left. In either an upright or inverted spin the "turn and slip" indication is the same.

Accelerometer

A second valuable instrument in spin orientation. An upright spin is illustrated. If the needle was showing negative G, the aircraft would be in an inverted spin.

but they are included to inform the inexperienced spin pilot just what he might expect. *They seldom would all occur at one time and expecting them will enable the pilot to combat them.*

The fluids in the inner ear, the primary balance organ, are subjected to unusual forces and sometimes transmit false signals to the brain and thence to the motor reflexes. The sensory stimuli from the eyes, muscles and skin of the pilot also send signals to the brain and when unnatural forces are experienced the brain might not cope with this myraid of conflicting information *unless the pilot is trained to combat them.* Orientation in the spin is difficult at times and sometimes impossible without reference to the turn-and-bank indicator and accelerometer.

The pilot might be affected by an immediate marked reduction in mental capacity. He might not know where to look to determine his position in space. He can experience a tunneling type vision and tend to look at one spot outside the aircraft or one instrument. His mind sometimes might become blank even though he is conscious. He would then experience extreme difficulty in concentrating on the required references for recovery. He probably cannot tell whether he is in an erect or inverted spin without referring to the accelerometer. He may make the correct control movements but in the ensuing aircraft gyrations unknowingly relax the forces required for the proper recovery control position. Know and trust the instruments. Experience has shown that the probability of a pilot choosing the proper direction for application of recovery controls without referring to the airplane's instrumentation is extremely low.

Judgment of time becomes inaccurate. The pilot usually requires more time than he thinks to make the proper recovery control movements and then overestimates the time required for response to recovery controls—a natural reaction. The pilot probably will not be able to count accurately the number of turns—this, of course, depends on the violence of the motion to which the body is subjected and the concentration power of the pilot. The direction of the spin is difficult to perceive. He may not be able to tell if the spin reverses without using the turn-and-bank indicator. Experience has shown that the probability of a pilot choosing the proper direction for application of recovery controls without referring to the airplane's instruments is extremely low.

These physiological and psychological factors, if they arise, create a problem that must be solved before the maneuver can be analyzed and the recovery made.

Experience is a wonderful thing. You can't beat it. Spin experience seems hard to come by these days because of restrictions on current fleet airplanes. It is suggested that if spin experience is needed that the T-28, TV-2, or T2V be used. It is recognized that these are straight wing airplanes. But it is expected that the spin restriction on the F9F-8T will be lifted soon. This airplane will only spin inverted but it is a good ride. However, the 8T, in the incipient spin, will oscillate about all three axes in a maneuver somewhat like the higher performance aircraft. This experience is valuable in spin recovery and recognition. Spin experience will help solve the physiological and psychological aspects and prepare the tactical pilot for inadvertent spins.

When spinning the pilot can best determine the direction and the type of spin by using the turn-and-bank indicator and accelerometer. Looking through the forward windscreen will give the next best indication. Looking to the side or rear is confusing. He should mentally fight to stay alert and observe his altimeter as well as the accelerometer and turn-and-bank indicator and then observe the airspeed indicator and altimeter during recovery.

► Once recovery controls are used be sure that they are maintained—don't relax until recovery is assured. Remember that time will seem out of proportion.

► Watch for spin reversals.

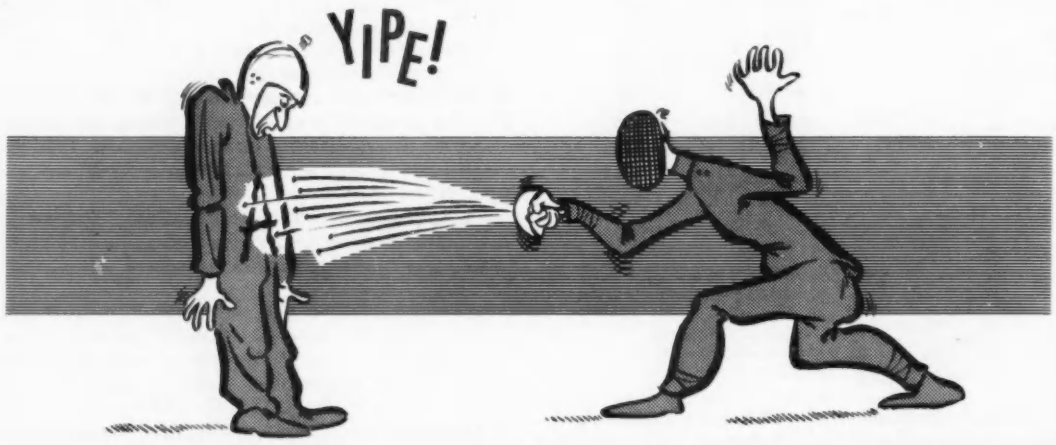
► Always be sure you have the proper recovery controls applied.

► Have an altitude fixed in your mind below which, if not in controlled flight, you and the airplane will part company.

► Use the flight manual that applies to your model airplane. The proper spin recovery techniques are there and if you fly your airplane as outlined you can recover from the spin.

Above all remember that your airplane is a weapon with a mission. You cannot afford to compromise the effectiveness of your airplane through ignorance or fear of spins. ●

ANYMOUSE



Stoof GOOF

DURING an advanced ASW exercise the "team" consisted of a P2V, several S2Fs, a couple of helicopters, two destroyers and, of course, our target the submarine. On this particular exercise things were going fine, with all units on the trail.

Then the unexpected element arrived in the form of a helo with photographer (PIO type) who wanted a few pictures of all these units working together. It was decided over the radio that we S2Fs would join on the P2V in right echelon for a low pass over the contact.

I was closest to the P2V and joined first in a standard rendezvous except that I came in high, due to his low (500-foot) altitude. After slipping in close in a level parade position I felt real good until I noticed this wire hanging aft from the P2V. Then it suddenly dawned on me that he still had his trailing wire antenna hanging out 100 feet behind! Believe me, it made a lump in my throat (heart type lump) when I realized the hazard of a rendezvous with that wire.

When we reminded him of the antenna you could almost hear him gulp and at once the trailing antenna began winding in.

As the P2V is not normally flown as a member of a tight formation it is easy to see how the trailing antenna could be forgotten, particularly with no advance briefing, so if a mixed formation is scheduled—think!

MASK UP

AFTER two RONs waiting for engine repairs to an AD and also for better weather I was real anxious to get home. I hadn't expected to stay so didn't have much in the way of baggage.

By the time Saturday rolled around the weather had let up, not ideal conditions, mind you, but

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— SUBMIT AN INCIDENT, PREVENT AN ACCIDENT —

good enough to fly the 160 miles to home base. I thought to myself, "No sweat."

Clearance came through with no delay and climbout was radar monitored. All was fine. The engine purred, I had good radio contact with the controller, then a new clearance came through and while copying it I suddenly found myself in a steep descending spiral.

At first I didn't believe what was happening but it dawned on me that unless I did something fast I would wind up a heap of rubble in the boonies. I fought off the vertigo and got the aircraft back into a steady climb, then got squared away with the radar controllers who had been unhappy with my erratic flight path.

After some length of time climbing I began to feel rather strange. The altimeter read 17,000 feet but in my subconscious I tried to shrug it off. Something wasn't right though. After 30 seconds of bumbling thinking it hit me—no oxygen mask. I couldn't understand how I had gotten to this altitude without my mask on but after hastily putting it on I felt much better in a matter of minutes.

In addition to some other items (had to finish hop by using the standby compass) I found my gyro horizon took about 30 seconds to straighten out after a turn. Since by this time I was in VFR conditions on top at 19 thousand I went to the old needle-ball-airspeed system. When the needle flickered and swung over the destination radio I made an uneventful letdown and landing but it sure felt good to have my feet on the ground again

The lesson for me is, if contemplating going to altitude, have the oxygen mask on before takeoff. All I would have needed to round the thing out would have been a load of ice. That would have really made it nice.

WING DING

ON a clear winter morning I was tow escort in an F8U-1. Descending through 12,000 feet with 1600 pounds of fuel remaining I actuated the wing position handle to the dirty condition to maintain a more comfortable and safe position of the banner. Everything reacted normally, I thought.

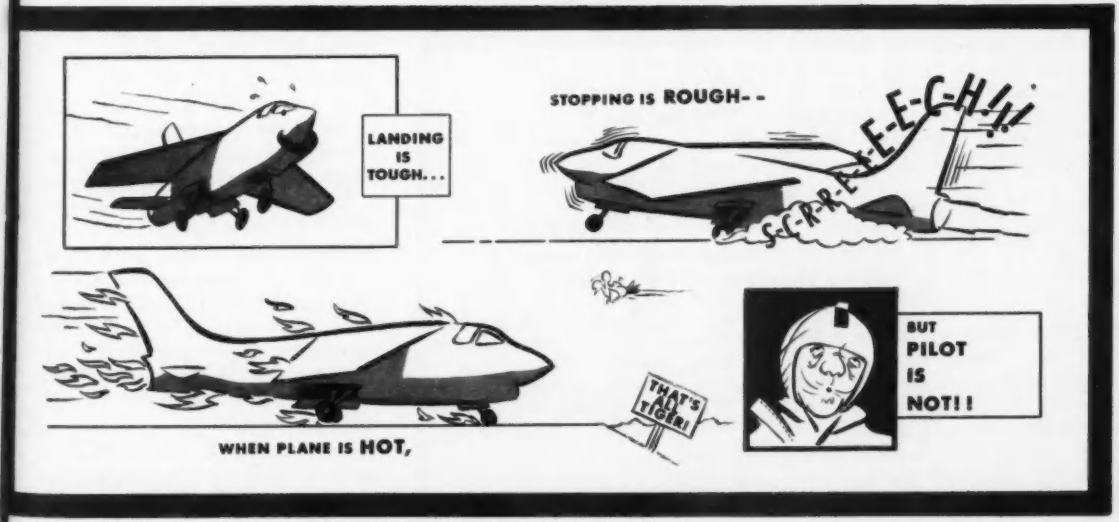
The plane decelerated, the nose eased over, and speed was held constant at 200 knots with a slight addition of power. I even thought the wing position light came ON, indicating a gear-up, wing-up configuration.

Everything continued normally to the field, the banner was dropped and I turned downwind. The approach was deep. At the 45-degree position it was obvious I would overshoot the wind line and the *Crusader* itself felt somewhat uncomfortable. Adding several percent RPM, I thought about taking it around but the overshoot wasn't too bad and a slight S-turn realigned me with the wind line.

As the end of the runway flashed past I knew I would land fast and long. Nothing to worry about for I wasn't *that* fast and *that* long with nearly 10,000 feet of hard surface available. Touchdown was smooth enough but as I pulled back on the stick to utilize aerodynamic braking I noted no pleasant deceleration. I pulled back further, placing the gunsight 150 mil ring on the horizon, and held it there.

Not much happened.

As the 3000-foot mark whizzed past I dropped the nose and tapped lightly on the brakes. At 80 knots I tromped on them. Keeping steady pressure on the brakes, the plane came to a stop some 200 feet be-



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yond the point where the runway ends. Alas — the F8U is difficult to land and stop when the wing is down — even if landing droop is out.

On reflection two blatant goofs come to mind:

First, whenever the wing position handle is moved one should pay attention to the feel of the airplane, but more important, he should look in the mirror to see if the wing actually has changed position. Chance Vought has made every effort to aid the pilot in this respect—there is not one mirror, but three. Wing incidence is also included in the landing checkoff list.

Second, when in the pattern if the plane feels at all uncomfortable, take it around. And keep this in mind; look at the position of your left elbow with your hand on the throttle the next time you climb into the F8U. It comes alarmingly close to the wing position handle, which may be bumped easily out of the up position. An electric solenoid prohibits doing this, but it's wise to be aware of this in the event of an electric failure and loss of secondary bus.

At any rate, remember to put the handle in its proper position —don't believe a push or pull will set it there. Investigation revealed it was possible to get the landing droop out with the wing down by actuating the wing handle to the aft position but stopping about one-eight inch short of the rear slot.

OVERBOOST

WHILE flying an HRS-3 I received a call that there was an overturned rowboat about 6 miles from the air station. Two men were in the water and the surf was heavy. On the way out I checked the tower for wind velocity and direction.

Shortly thereafter I spotted the men and started an approach. Then I fouled up. I should have checked the winds at the scene instead of relying on the tower report but in my haste to make a quick pick-up I didn't. The result was a downwind approach with power settling. I was too close to the water to use normal procedures so I added power. My descent was finally stopped with one wheel in the water but I had pulled 47 inches manifold pressure. Red line on this engine is 39.5 inches. Luckily I kept my RPM at 2400.

Did you also tell those persons who have a need to know?—Headmouse.

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PUNCHY

THE day previous to my hairy tale was a normal working day during which I flew only one short hop. Early that evening I slept for several hours and then got up to check our aircraft for a special weapons alert. The work kept us moving at a pretty good pace and I finally got to bed at midnight. At 0200 I again got up to check the aircraft for the same purpose and went back to bed at 0600.

By 1030 I was awake and felt tired but since I wanted to be on time for the noon meal, I got up. After lunch I was requested to fly a 2 plus 15 hop. I was feeling all right so I accepted.

Takeoff was at 1400 with poopy suit; water temperature was 56°. We returned to the ship on time but dogged for 45 minutes making the hop three hours. I made an uneventful approach and landing; however, I felt completely "wrung out." Strangely enough I did not feel like sleeping, just wanted to take it easy. After getting out of the poopy suit I had just enough time to make the evening meal, and

afterwards I again felt "normal." At 1830 I was requested to fly a night hop (2 plus 15) and I accepted. This time there was barely enough time to put on my flight gear (no poopy suit), get a quick briefing and man the aircraft.

The first part of the flight was uneventful except for a slight feeling of being "off." Then I found it increasingly difficult to keep the aircraft straight and level. Upon returning to the ship I didn't feel tired but suddenly became "punchy." This process had actually been creeping up on me, but it seemed to hit all at once. I was now actually trembling from extreme nervous tension.

It was impossible to maintain a good pattern; it was all I could do to watch one instrument at a time. Erratic was the word for my airspeed and altitude control. I had very little feel of the aircraft and it was literally driving *me* around the pattern. I got a bolter on the first pass but fortunately got aboard on the second. I was so exhausted that evening and the next day I just couldn't get enough sleep.

This is my first experience with real fatigue and it should be noted that at no time did I consider myself warned of this condition by drowsiness.

LINEUP

ONE night I wandered over to a neighboring, but unfamiliar, airfield to shoot some touch-and-go landings. GCA practice was in effect on runway 9 right with one plane and chase. On my fourth pass I was cleared from the 180 spot to land on runway 9 left.

Shortly after turning off the 180, I noticed the lights of the plane using 9 right. As I got to the 90-degree spot it appeared we were on a collision course and I was keeping one eye on the other aircraft and one on the runway. Turning into the groove it became apparent that there would be no collision. I breathed a bit easier and commenced to flare as I approached the threshold lights.

As I passed what I believed to be the threshold I noted that the lights were flashing and they were not green. Full power was added and the gear was pulled up as I realized my true position. It was as close as I'd ever care to come to making a landing *between* the runway and paralleling taxiway.

Subsequent investigation proved the area on which I was about to land was a wet grassy strip and was marked very nicely by the white runway lights on one side and the blue taxiway lights on the other. The moral for me; watch the other guy, but pay attention to your own business, especially in strange surroundings.

ICED UP

ON THE last leg of a TransPac from Hawaii to Japan, Guam to Atsugi to be exact, our flight of FJ-4Bs had been cleared to cruise at 39,000 feet which kept us in a thin cirrus layer for about 45 minutes. About halfway between Guam and Iwo my wingman called and said he was losing power.

I gave him the lead and said I'd fly wing. After moving back I added throttle to hold a wing position but also experienced a power loss, down to 82 percent. The thought of all that expanse of salt water around us sharpened our thinking, and we both retarded to IDLE, switched to MANUAL, and recovered full power. The power loss was due to icing of the pres-

Continued from preceding page

sure sensing probe of the engine fuel control.

We climbed back to altitude and continued to Iwo where the tanker was met. For the refueling we switched back to normal fuel prior to engagement. The rest of the hop was normal.

Several other flights ahead and behind us experienced the same icing conditions but did not switch to manual and lost considerable altitude before recovering power beneath the weather. I'd like to stress the importance of having the throttle lever in the full idle position before switching to MANUAL and also the importance of monitoring TPT and RPM very closely in a manual climb. At our altitudes the throttle was about an inch from IDLE with the RPM at 100 percent.

DOUBLE CLUTCH

DURING a night takeoff, at a speed of about 75 or 80 knots, I noticed a light passing from starboard to port. At first I knew it couldn't be any thing but reflection on the windshield of the S2F, but as I progressed down the runway this light continued across my takeoff run. I gave it a second look and about that time recognized a pickup truck crossing the runway ahead.

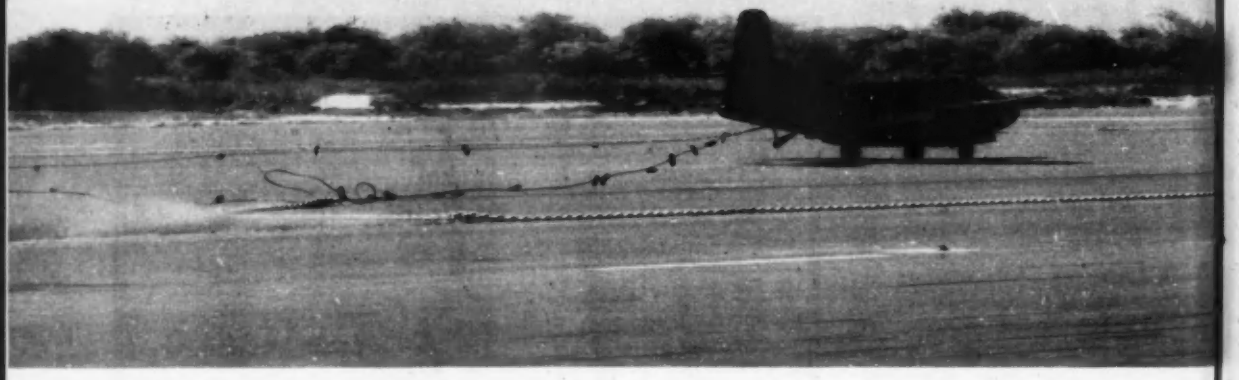
As soon as I realized the situation I pulled the aircraft off the deck, missing the truck by nearly 50 feet altitude but had I been unable to get airborne we could have collided.

It seems that the mixup resulted when I called for takeoff clearance and the truck called about the same time for clearance to cross the duty runway. We were both cleared but the tower thought the truck was at the approach end of the runway and would cross behind me. However, the truck was at an intersection in *front* of me.

Normally the station procedure calls for a driver to flash his lights and be positively spotted by the tower operator before obtaining clearance to cross the duty runway. This is one time it wasn't done and one time it could have been fatal.

Both the copilot and myself felt like we sprouted a few grey hairs but I bet the truck driver was more scared. To this day I swear I heard him double clutch the truck and dig out when he realized we were bearing down on him. ●

GOING TO BE ARRESTED?



AFTER the pilot experienced a jammed throttle, an F11F made a deliberate attempt at engaging an emergency chain type arresting gear at a speed estimated at 240 knots. The pendant failed and in the resulting crash the pilot sustained fatal injury and the aircraft received strike damage.

BuAer (ltr AER-SI-223/81 dated 12 Dec 58) advises all activities concerned of the permissible engaging speeds for emergency chain type arresting gear. The maximum recommended engaging speed for emergency chain type arresting gear is 150 knots.

In a few isolated cases, successful arrestments have been accomplished at engaging speeds up to approximately 170 knots. The chances for a successful arrestment in the 150 knot range are in large part directly related to the correctness of the installation (proper components and chain mass pickup) and, in particular, the condition of the arresting pendants. Pendant inspection and replacement criteria, which must be religiously adhered to, is contained on page 3, paragraph 3.i(2), of Emergency Chain Type Arresting Gear Bulletin No. 7, NAEF-SE-326 dtd 9 June 1958. If ordinary wire rope were used in place of the special deck pendants, failure might be anticipated as low as 120 knots.

No absolute engaging speed limit has been imposed on the equipment because a test program to establish a definite maximum engaging speed has not been completed. It has never been intended that the subject equipment be utilized under speed conditions other than the landing approach speeds (1.3 times stall velocity at recommended runway landing weight) of current fleet-type aircraft.

It is realized, of course, that isolated inflight emergency situations can arise from which the escape procedure possessing the least potential hazard to the pilot is engagement of the chain arresting gear, even if such engagement is at a speed above the established absolute limit for the equipment. In a situation such as this the decision as to the best emergency procedure must rest with those directly involved. When a known emergency arises with an airborne aircraft, such that engaging speed into the chain arresting gear would be in excess of 150 knots, it is recommended that emergency procedures other than engagement of the chain arresting gear be exercised whenever possible.

With respect to aborted takeoff emergency situations, a flat statement that the subject arresting gear will accept such-and-such aircraft under such-and-such conditions would be lengthy and quite unrealistic in view of the many variable factors of runway length, ambient temperature, runway elevation, etc., which affect the magnitude of liftoff speeds. It can only be said that the same arresting gear energy absorption and engaging speed characteristics that apply to emergency landings apply also to the aborted takeoff.

Under no circumstances should pilot decision to abort a takeoff be delayed because of knowledge that an emergency gear is available at the end of the runway. Decision to abort should be based on the usual parameters of remaining runway and distance required for stopping, using wheel brakes, aerodynamic braking, drag chute, etc. The arresting gear will then serve as an assist to stop the aircraft from rolling off the runway onto unprepared surfaces. Again, as in the case of emergency landings, the decision to attempt to engage the chain arresting gear on an aborted takeoff at an excessive engaging speed, when such a situation presents itself, must rest with the pilot.

BuAer states work is in progress now to:

a. test various chain configurations and initial chain pickup weights to establish definite engaging speed limits and energy capabilities for chain arresting gear, with the objective of increasing the engaging speed capabilities.

b. In conjunction with (a), review arresting pendant size currently specified for use with chain gear and analyze present inspection and replacement requirements for the pendants for adequacy.

Any changes in chain arresting gear design and maintenance resulting from the above will be reflected in a future bulletin.

Middle Road

Emergency arresting gear like the arresting gear aboard ship should be engaged on the centerline to gain the best deceleration. Off-center engagement lowers the effective capacity of the field type arresting gear. Ref: BuAer Spd-Ltr AER-SI-12/5 of 31 Dec 58. ●

WHIZ QUIZ

1. What is the significance of the date 30 June 1959 as it relates to aviators' instrument ratings?

2. The Mk-13 distress flare has several small bumps near one end to aid in identification; are the bumps at the NIGHT FLARE or the DAY SMOKE end?

3. On landing you lose a tiptank which strikes a parked aircraft; the parked aircraft is totally destroyed by fire, and there is no damage to your aircraft. How is this reported—as an INCIDENT, an AIRCRAFT ACCIDENT or a GROUND ACCIDENT?

4. You've lost your transmitter and brakes; how would you signal your loss of brakes to your wingmen?

5. An overboost could precipitate engine failure by imposing excessive forces on the con rods and pistons; in what way is underboost harmful?

See Answers on page 40

Conscious Effort REQUIRED

THE LTJG had 730 hours with 240 hours in the F8U-1, including 35 F8U arrested landings. In the training cycle his performance, as compared to his contemporaries of equal experience, was consistently above average. During carrier qualification he experienced no unusual difficulties and has been considered at all times as a rather consistent and reliable pilot. He has not demonstrated any trend of diving-for-the-deck on his carrier mirror approaches.

Those few sentences convey the competent background of a *Crusader* pilot returning to his carrier and the weather and sea conditions also encouraged the prospects of a troublefree recovery. There was scattered cumulus at 1500 feet, 10 miles visibility, wind over the deck was 36 knots at 355 degrees relative. The existing sea state gave very little roll or pitch to the ship.

"I called turning base with a fuel state of 1600 pounds," the LTJG said, "and intercepted the glide path about 1½ miles astern at 500 feet altitude, 140 knots IAS. The meatball was centered until just approaching the ramp when it went slightly high. My IAS at this time was 136 knots. I did not consciously apply forward stick or ease back pressure to correct for the high meatball indication and a normal arrestment was anticipated."

Number 2 wire was engaged but immediately upon touchdown there was an explosion and puff of smoke or atomized fluid as the port landing gear tension strut exploded. The wheel and shock strut sheared from the airframe and the pilot saw them fly ahead and off the deck.

"The touchdown was slightly harder than I have usually encountered," noted the pilot. "However, in the past, I have made what I consider harder landings."

From evidence (witnesses, movie films, inspection of damaged parts) and in view of the existing weather conditions at the time of the accident, the accident board was of the opinion that the port main landing gear failed under an abnormal load. Although the pilot said he did not ease the nose position down, movie film picks up the aircraft in its approach already in a definite nose-down attitude. The aircraft maintains this attitude until about 6 to 8 feet above the deck, when the nose attitude commences to rise. At this time a review of the movie film indicates that the sink rate accelerates.

"After talking to several witnesses," said the pilot, "all of whom agreed that the nose of the aircraft did drop approaching the ramp, I feel that this accident could have been prevented had I made a conscious effort not to attempt to correct for the high

meatball presentation at this critical point in the pass." The pilot's CO included this aspect in his comments on the accident: "Each pilot must be schooled to realize fully the need for concentration and self-discipline during the carrier approach to avoid the hazard of unconscious control manipulation."

LIP SERVICE — When twilight faded into darkness the R5D was 30 minutes from a landing at home base. The flight had been droning along smoothly at 5500 feet in CAVU weather and now the pilot set up a shallow rate of descent. At sunset he had gone on oxygen and he continued using it until the transport was below 5000 feet, a total of about 20 minutes.

Both pilot and copilot had over 7000 total hours, each had more than 2000 hours in R5Ds and was a green card pilot.

Construction of an overrun had been in progress for some time at the approach end of the duty runway. During daylight hours the tower had been cautioning all aircraft of the construction but at night it was assumed that the threshold lights were an adequate warning. The pilot of the R5D was aware of the construction — however, he was not specifically aware that a 10-inch lip existed on the end of the runway.

Aboard the aircraft were several senior officers and as the air station lights came into sight the pilot became more conscious of his passengers' rank. As a consequence he planned the approach to land short as possible in order to turn off at the intersection in front of the operations building.

Full flaps were lowered on the last quarter mile of final approach. "Just prior to the point where I was going to reduce power and start to make the landing the copilot read off the speed as 100 knots," said the pilot. "I eased the power off when I felt I had the runway made and the aircraft settled out just a bit faster than I had anticipated . . ."

Before the threshold lights were crossed the throttles were completely closed (resulting in negative thrust) and the nose of the aircraft was rotated upward. The aircraft, low and in a flat attitude, did not respond and landed short of the runway.

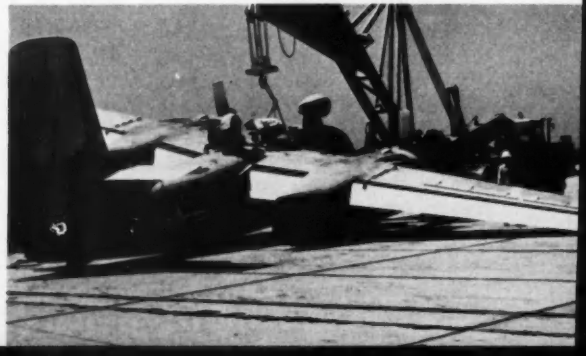
Touchdown was slightly left wing low and the port gear hit 10 inches below the surface of the runway, blowing both tires. Both other gears hit the lip, closer to the surface of the runway, but did not blow out. After a bounce the R5D touched down and rolled normally for several thousand feet then veered to the left and went off the runway. The aircraft received overhaul damage.

HINDSIGHT—After being catapulted the port main and nose gear of an S2F retracted normally but the starboard gear remained in what appeared to be the full down position. Recycling failed to retract the starboard gear and emergency methods failed to give a positive "down and locked" indication on it. The pilot then diverted to the beach, leaving the wheels down. On the way to shore another aircraft inspected the starboard wheel well and reported that the gear appeared to be down and locked.

Shortly after the S2F arrived over the air station which had been selected for the landing the crash crews were deployed and other traffic cleared out. Commencing a normal approach the pilot instructed the copilot to "standby the feather button and watch the gear." He continued, "if the gear folded the copilot was to feather the props. I landed hot (extra 10 knots) so I could hold the wing up till the prop was feathered."

Please turn page

Touchdown was short of the concrete by just a few feet.



Until turning off the runway it appeared the gear was locked.

Continued from preceding page

Touchdown was made on both main gears about 1000 feet from the approach end. Brakes were tapped several times immediately after touchdown. "After the weight of the aircraft was on the gear and it held," said the pilot, "I decided it was going to hold and continued a normal rollout." The aircraft was down to taxi speed before 4000 feet had gone by and, said the accident report, the pilot was cleared by the tower to "pull off to the right" and told that the crash crew would check the starboard gear.

As the pilot applied right brake in an attempt to turn onto an approaching intersection the starboard gear collapsed. Though moving at slow speed the S2F slewed to the right as the gear folded and crunched to a stop 90 degrees from the runway heading.

A material failure was responsible for the failure of the starboard gear to lock down but in view of the fact that the pilot was given a share of responsibility for the accident, it is worthwhile to detail the statements of those concerned, plus the recommendations for future situations.

The copilot said " . . . we slowed to taxi speed. At this point I informed the tower that everything seemed normal. The tower suggested that we stop and have the crash captain inspect our wheel and I agreed. As we approached the intersection . . . the pilot eased toward the right side of the runway in preparation to turn off."

It was seen from the tower this way: " . . . he rolled out without incident. He advised the tower that his gear was apparently OK. The pilot was then cleared for a right turn at which time the starboard gear collapsed."

The board commented that, "whether or not the starboard main landing gear would have collapsed if the pilot had landed without applying brakes is a matter of conjecture. In view of the statements of the aircraft crew to the effect that the landing gear did not collapse until an attempt was made to turn off the runway, it appears very possible that the precautions (mentioned in next paragraph) would have prevented this accident from becoming a major accident, even though the landing gear was not positively locked down. It would appear, therefore, that the pilot's decision to turn off the runway was a contributing cause to the accident."

"Proper procedure," said the squadron CO, "should have been to remain airborne until fuel was burned to a minimum and maintenance personnel were on the scene. In addition, the engines should have been cut and props feathered just after touchdown and the aircraft allowed to roll to a stop with no application of brakes. The aircraft should have remained on the runway until 'stiff knees' could be inserted."

MIXED DRINK—Policy of the helicopter antisub squadron was to leave the mixture in NORMAL except for takeoffs, landings, and when drawing rated military power. However, one pilot mistakenly believed that when hovering during poor flight conditions the mixture should be RICH to protect the engine. These flight conditions included high temperatures, high humidity and very low wind velocities and when hovering during the early part of each flight considerable power was required.

On a scheduled ASW screening hop the HSS made two sonar dips with no difficulties. Upon completion of the second hover the copilot took control of the aircraft. Proceeding to the third dipping point the copilot requested the mixture be placed in the normal position and upon reaching the desired spot he commenced a turn into the wind and began descending. "When I had about 30 feet altitude," said the copilot, "and about 20 to 30 knots forward, I noticed that the mixture was still in NORMAL and requested the pilot to place it in RICH."

Previously, when the copilot had taken control, the pilot had completely relaxed, "secure in the knowledge," said the accident report, "that the plane was in capable hands." Now, as the HSS began to flare, transitioning to hover, his detachment was interrupted by a request from the copilot to put the fuel mixture in RICH. Without thinking he reached to the mixture handle, grasped it firmly, but pulled instead of pushed and placed the handle to IDLE-CUTOFF.

"As I realized I was moving it in the wrong direction the engine cut out," said the pilot. "I immediately slammed it to FULL RICH and the engine fired again. However, as the engine cut out the copilot pulled up collective so that when the engine caught we did not have enough rotor RPM to prevent settling into the water."

The requesting of mixture changes in a critical flight position was considered to be poor judgment by the accident board. The fact that the mistake happened at a time while transitioning to hover with added gravity forces acting on the aircraft, created a condition where recovery was practically impossible.

Though the primary cause of the accident was the inadvertent movement of the mixture control to IDLE CUTOFF, the board felt an important consideration was

the technique used. When the controlling pilot (copilot) requested the mixture change the pilot firmly grasped the control, depressing the trigger mechanism on the handle, and moved it aft fairly rapidly.

During helicopter training the pilot had checked out in the HUP and the mixture control in the HUP and HSS are the same except for the locking mechanism. On the HUP, the lock must be depressed before the mixture control can be moved from the rich position; whereas on the HSS, the mixture control can be moved from the rich position to the normal position without depressing the lock. Both helicopters have a detent position for normal.

For a pilot checked out in the HUP it would be normal procedure to depress the lock before attempting to move the mixture. In the HSS the only time this procedure is necessary whenever it is desired to move the mixture control past the normal position into the manual lean or idle-cutoff position. Somehow, said the accident report, this was never explained to the pilot, or if it was, it did not make a lasting impression.

"It is ironic," the squadron CO commented, "that at 0800 of the morning of the accident all pilots were lectured on remaining alert and using good headwork at all times even though not actually at the controls . . . Yet less than 10 hours later an aircraft was lost because of inattention."

SUDDENLY IT'S HOT—On one of the first hot days of the year, when afternoon temperatures were 95°, a TV-2 was cleared for takeoff on the 8000-foot duty runway. The wind was reported calm. After a 100 percent rpm engine instrument check the pilot commenced his takeoff roll.

The aircraft was not specifically observed leaving the ground but tower personnel saw it airborne, with gear up, and settling back to the runway. Touchdown was 4500 feet from the approach end of the runway and the TV-2 slid some 3500 feet to the other end. Highest altitude gained was about 15 feet where the pilot said he raised the gear and felt the jet begin settling.

In spite of the fact that the pilot recounted a normal takeoff in his statement, nosewheel lift off at 100-105 knots with the plane flying smoothly off at 120 knots, the facts brought out during the investigation pointed toward improper technique.

No evidence could be found to indicate an engine malfunction and the pitot static system and airspeed indicator were tested and found to be functioning properly. The possibility of throttle slippage was considered to have no bearing on the accident.

From charts in the Flight Manual for the TV-2 the takeoff roll should have been 3800 feet with a normal liftoff indicated airspeed of 119 knots. Due to the field layout, actual takeoff roll began at a point 300 feet from the approach end of the runway so by adding the two figures of takeoff roll and commencement point, the aircraft should have become airborne 4100 feet down the runway. However, the initial impact after settling to the runway was at the 4500-foot mark and if it is assumed the takeoff was *normal*, then the aircraft should have been airborne for a distance of only 400 feet.

At the time of initial touchdown the landing gear was up and locked and flight tests during the investigation showed the landing gear retraction time to be 5 to 6 seconds. With 119 knots equal to 200 feet per second, multiplying the shortest landing gear retraction time of 5 seconds by the rate of travel gives strong evidence that the TV-2 was airborne for at least 1000 feet prior to the point of initial impact. Thus, indications are that the gear was retracted at or before the 3500-foot mark and that the pilot pulled the aircraft into the air after a ground roll of only 3200 feet.

Using the Flight Manual again, the accident board found the maximum airspeed after 3200 feet of ground roll to be 112 knots. This was exactly halfway between the power-on stall speed of 105 knots and the recommended lift-off speed of 119 knots. A warning in the manual specifically cautions against takeoffs below the recommended airspeed: "Although it is possible to takeoff about 10 knots slower than noted above, taking off at too low an airspeed may cause the aircraft to settle back onto the ground."

Although the board concluded that the pilot took off after too short a ground roll with too low an airspeed for existing conditions, the apparent reason for this error is of more interest. In the spring and winter months preceding the accident the pilot had logged considerable time in the TV-2. Most of these hours were flown on cool days of course. It seems likely, the board said, that the pilot felt he should be flying when he was approaching the 4000-foot mark because always before he had been flying at that point.

On this day, when the duty officer had published the 95° temperature in a clearly visible position on the aircraft assignment board, a review of hot weather techniques seemed in order. Charts for computing takeoff ground roll were available in the pilot's readyroom but with the takeoff phase relegated to a routine, no action was taken and the accident followed. ●

Recently considerable emphasis has been placed on the danger of overboosting the engine. In contrast, little fanfare has been given the dangers of underboosting. Underboosting can be just as detrimental to your power-plant as overboosting. So,

KEEP THE PRESSURE ON!

By Rudolph Signoretti

Operations Engineer
Curtiss-Wright Corp.

. . . . Well, at least some of it! This seems a little ironic, considering that contemporary philosophy dictates slow down, relax, relieve the pressure. Of course, this is perfectly straight dope when related to the human machine, but not at all true when applied to your aircraft's reciprocating powerplant.

Your engine has been designed and built as precise and rugged as modern engineering know-how will allow. Powerplants, such as the R3350 turbo compound, not only deliver power with low engine weights, but continue to do so, reliably, for many hundreds of hours.

To achieve a good reliability rating requires a few rules of the road, particularly in regard

Figure 1. Piston pin boss cracking due to underboosting

Figure 2. Piston ring groove wear resulting from ring flutter

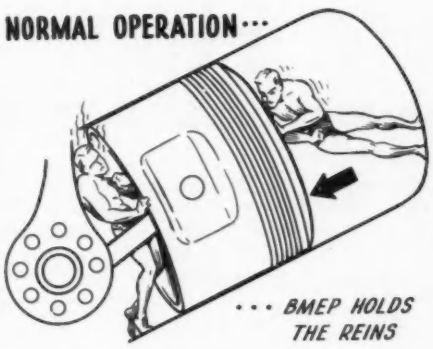


Figure 3

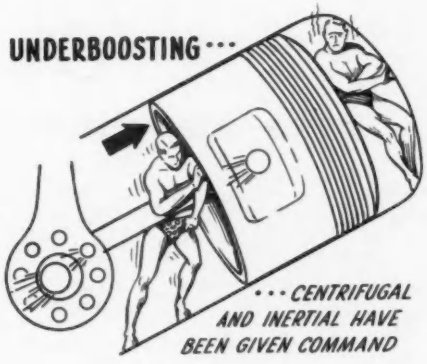


Figure 4

to sound operating practices and techniques.

Technically, underboosting occurs when the combustion pressures do *not* equal or exceed the centrifugal and inertial forces generated by the crankshaft speed. This condition results in reverse forces being applied to the piston pins and bosses, master rod bearings and knuckle pins. Consistent operation in this condition may result in failure of these parts (See Figure 1). In addition, piston ring flutter may be induced (See Figure 2). Should any of these conditions arise, engine failure could follow.

It has been said a number of times that one picture is worth many, many words. So, in the interest of better understanding, let us picture a series of pistons and rods attached to a crankshaft revolving at high speed (2000 plus RPM). To balance the terrific centrifugal and inertial forces, the expanding combustion gases in the cylinder push on the piston in the opposite direction.

Normally, the gaseous pressure on the piston equals or exceeds the outward forces created by the rotation of the above system. Consequently, this creates torque, power and the prop thrust needed to propel the aircraft (See Figure 3). Under some conditions of flight, particularly descent, the exact opposite can occur. With the propeller governor maintaining a constant RPM, it is possible to throttle back to the point where the gaseous pressure on the piston will fall below the centrifugal and inertial forces of the rod and piston mass. This results in a condition of engine operation known as *underboosting* (See Figure 4).

How do we know when underboosting occurs, and better still, what do we do to prevent it?

We have the answer to the first question as soon as we can determine when the combustion gas pressure falls below a certain value at a given RPM. With a constant mass (piston and rod) centrifugal and inertial forces that are generated are a direct function of RPM. Now, since combustion gas pressure and BMEP are directly related, all of the variables that affect BMEP would have to be considered in a theoretical evaluation. Engine operating variables such as manifold pressure, altitude, carburetor air temperature, fuel-air ratio and spark advance would have to be accounted for.

Obviously, to arrive at the exact BMEP value, the man behind the throttle would have to be a mathematician equipped with a slide rule, graph paper and at least a dozen sharp pencils. Well, breathe easy, because the problem has been greatly simplified. After much analysis and compromise, all of these variables but one have been eliminated. *Manifold Absolute Pressure has been determined as the criteria.*

Further, a constant relationship between MAP and RPM has been established. From this relationship evolves the answer to the second question: to preclude underboosting, "Maintain approximately one inch of manifold pressure for each 100 RPM."

So, the next time you start the letdown for your home base, after that long mission, remember the equipment that delivered you there. Ease the throttle back, but *keep some pressure on.*

Wet Dry Run

A "dry run" need not always be dry, for wet is exactly how you end up when you get a dry run in survival and rescue techniques at VF-101, the Key West based F4D/F3H squadron of Replacement Air Group Four.

Convinced of the vital importance of being prepared for water entry and helicopter exit by actual practice, the squadron set out to provide a realistic means of dunking student aviators. Water was no problem—there's plenty all around Key West, but it took MARY ANN to solve the problem of how to give the victims a practice drop in the drink. MARY ANN, a floating crane, was moored locally in connection with an underwater project, and was available and willing to assist in the life-saving training. A modified parachute sling was devised by Chief Parachute Riggers R. I. Elam and R. W. Schenck, and arrangements were made with HS-5 to retrieve the dunked pilots. Crane operators were briefed to lower the pilot until his feet touched the water, at which time he was to throw clear of the harness. He would then inflate his life jacket and swim away from MARY ANN so the helicopter could accomplish its rescue at a safe distance.

All aviators passing through the VF-101 RAG program are required to take a wet-dry run. Under the command of Captain G. C. Duncan, the squadron turns out qualified F3H and F4D pilots. Some already are slated for a squadron upon completion of their training, while others may remain with the squadron for a time before receiving orders. ●

Skipper of MARY ANN looks on as R. I. Elam, PRC, and R. A. Beers, PRI, adjust raft. First "victim" being strapped in is LT Gus Leydon, VF-101 Assistant Safety Officer. After being swung over the side, Leydon is lowered by crane operator, turns loose soon as his feet contact water surface.

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Where there's smoke there's a hitchhiker waiting for a pick-up. Trainee must be prepared for seat or sling rescue, isn't told in advance what he'll get. Crash boat stands by during these training rescues, in case rescuers become ditchers.

Up and away . . . students find the seat is far superior to the sling. They're taught to leave the raft before pickup, as downwash blows raft away, also blows water into the face before 'copter gets directly overhead.

One wet aviator, coming up . . . training for VF-101 students also affords excellent opportunity for HS-5 rescue training. LTJG N. H. Lowery displays olympic-like form in sling as he's hoisted into HSS flown by CDR R. S. Olive of HS-5 and MAJ Joe Greene of NASC.

O-CLUB Saturday NIGHT

IN THE main dining room, the scraping sounds of chairs being pushed back from tables mingled with the rattle of dishes and silver and the strains of the Saturday night dance band tuning up. In the adjoining bar, a white-jacketed attendant wiped circles of moisture off the counter as two aviators approached.

"What'll it be, gentlemen?"

"Couple of beers. Okay, Bob?"

"Right, Jim. Match you for it."

A few minutes later, the two pilots were settled in a corner, glasses in hand.

"Now, my friend, let's have the whole story, or as the Madison Avenue types say, the Big Picture," Jim said as he lit a cigaret and stretched back for an ashtray from the next table.

"Okay," Bob said with a grin, "but remember, as the television types say, YOU asked for it!

"First, just to relieve your anxious little mind, I came out of this whole thing all in one piece. What really hurt, though, was that my accident was the first one in the squadron in almost two-and-a-half years — nearly 44,000 hours of flying. I couldn't have done anything to prevent the accident—it was cylinder failure—but, man, I sure hated to be the guy to shoot down that squadron record. And another thing that killed my soul was that I was so damn careless when I strapped in. But I'll get to that later.

"There I was cruising along in my AD-4B . . . beautiful day . . . IFR . . . clearance on Green Six . . . ceiling unlimited, visibility 15 miles. I'd been up about four-and-a-quarter hours. Dusk was just coming on.

"All of a sudden there was a surge in the engine and it began to run rough; flames started coming out from the lower right side, then along the right side of the canopy. I decided to bail out. I was afraid flames might come into the cockpit when I opened the canopy so I reached back for the fuel selector handle and turned off the gas. A few seconds later, the fire went out but smoke continued to come from the right side of the engine and into the cockpit through the crack between the canopy and the fuselage.

"As I said, I had made up my mind to bail out so I broadcast a Mayday on channel 4. Couldn't get through the traffic for other aircraft making position reports so I went to guard. Some guy was yakking on guard so all I could do was push the mike button and broadcast in the blind. Then I went back to channel 4 and broadcast in the blind again. I found out later that somebody heard me, but as it worked out, it didn't make any difference because I didn't bail out."

"You didn't bail out?" Jim interrupted.

"I didn't bail out. But it wasn't because I didn't try. First, I disconnected my radio cords and

oxygen hose. When I couldn't breathe through the mask—excitement, I guess—I unhooked my mask from my helmet which, by the way, is NOT the thing to do before a bailout. I unlocked my seat belt, opened the canopy, stood up and started to bail out. Then, I say in a masterpiece of understatement, I began to have trouble.

"The first thing that happened was I lost my APH-5 helmet. And don't think I enjoyed telling this bit at the green table—(1) my visor was up; (2) I didn't have a nape strap; and (3) my chin strap was loose because I'd been using my oxygen mask to hold my helmet on. The AAR described my performance as 'violating several rules of survival,' I believe."

"So what happens next?" Jim asked.

"Well, there I am . . . trying to bail out . . . the aircraft is descending 2000 feet a minute and—get this—something is holding me fast in the cockpit. I tugged and I pulled and I yanked but I couldn't break loose. Then I looked for whatever it was that was holding me.

"Now let's go back for a minute to when I was strapping myself in before takeoff. You know that small canvas bag we're issued on a cross-country for the let-down charts, RadFacs, gas chits—all that stuff?

"Normally I carry this between the seat and the right console where it won't be in the way. When I strapped in, I inadvertently (that's a word that covers a multitude of sins) . . . I inadvertently looped my right leg strap through the handle of the map bag. When I did this, the seat was in an up position. After takeoff I bottomed the seat to get low enough to see the instrument panel. When I bottomed the seat, the map bag got caught under it. So there I was, held fast to the map bag by my leg strap and the map bag held fast to the aircraft by the seat."

"What did you do?"

"Did the only thing I could," Bob replied. "Sat back down, unhooked my leg strap, freed it from the map bag handle and restrapped it. My altimeter was registering between 4000 and 5000 feet. I knew the terrain in this area was about 1000 feet, higher in some places. I felt I might be too low to bail out safely so I decided to ride the aircraft down. Naturally, in this event, I wanted the protection of my shoulder harness. Remember I had unfastened my lap belt when I was getting ready to bail out? My shoulder harness was now hanging out the left side of the cockpit in the slipstream. I hauled it back in, put it on, secured my belt and cinched up tight. Fortunately, the aircraft stayed trimmed and I was able to hold it level with my knees while I strapped in.

"I started looking around for a good place to belly the plane in. There was a highway below but that was out because of the cars. Nearby there was a plowed field but I saw houses at the far end which I might hit if I overshot. Time was getting short. All that was left was this small dirt road going through some woods. There were other better roads and fields around, but by this time I was too late and too low to pick any other spot but the one I was headed for. I lined up on the road, flaps down, wheels up, canopy open, airspeed 130. I thought I had it made."

"This is the end?"

"Not quite. Right where I was going to touch down I saw an old stone chimney about 30 feet high where some house had been. I was sure I was going to hit it. I banked the aircraft to the right around the chimney and back to the left onto the road. I sheared the tops off of some trees before I hit the ground nose high and wings level. With no helmet I was worried about knocking myself out on the gunsight so I put my head down and my arms over my head. I guess my shoulder harness was tight enough because I didn't hit the gunsight. The impact felt something like an arrested landing aboard ship. The plane slid down the road about 150 feet, kind of sideways, and came to an abrupt stop against a six-foot bank.

"I unlocked my lap belt. There were flames all around me. I figured the fuel cell had ruptured when I saw gas burning on the ground. I didn't take time to get rid of my chute pack. I stood up, stepped out onto the left wing, went out to about the tip and jumped to the ground. Then I started running.

"When I was about 30 feet away, I felt a big blast of hot air and heard a big 'Whoosh.' I turned around and saw what was apparently the fuel tank blowing up. I kept on running until I was well clear of the aircraft; then I took off my chute and started up the road to look for a farmhouse.

"My only injuries were what the docs call 'minor' bruises and one small cut on my chin from the parachute chest buckle."

"You sure almost had it that time," Jim said shaking his head.

"I sure did—talk about lucking out. You know, you really don't take all that safety and survival stuff to heart until something like this happens to you. From Pensacola on, I've heard about checking personal equipment before each flight and taking time to strap in carefully and correctly. I didn't pay a whole lot of attention to it—I got careless—and the lesson really came home!"

Flight Quarters for the Flight Surgeon

Where should the squadron flight surgeon be located aboard a carrier during flight operations? There is apparently some difference of opinion among senior line officers—as well as aviators and flight surgeons. In view of this, it is interesting to note the following opinion of the Force Medical Officer, ComNavAirLant. This philosophy is also concurred in by the Force Medical Officer, ComNavAirPac.

"A RECENT report of an air group flight surgeon on the death of one of his pilots intimated that if that flight surgeon had not been required to remain on the flight deck during all flight operations he could have had better opportunity to contact pilots in the readyroom and could have discovered that the deceased pilot was suffering of fatigue before his fatal flight was initiated.

"It is difficult to prove or disprove the above hypothesis but the existence of such a concept focuses attention to the sagacity of insuring freedom of action by the squadron flight surgeon as is necessary.

"It is alleged that on some ships a flight surgeon is required to be present on the flight deck during all flight operations and must not leave the flight deck during such operations unless relieved by a doctor. ComNavAirLant has no instruction to this effect. If any such order is in effect on any NavAirLant ship, consideration or revision of such order is recommended.

"AirLant/AirPac CV Medical Instruction 5400.1, chapter 1, section 3, places the responsibility of direction of an embarked flight surgeon upon the medical officer of the ship. It, therefore, would be wise for each carrier medical officer to so write his standing orders as to avoid any rigid instruction requiring the squadron flight surgeon to be on the flight deck during *all* flight operations. This would give the flight surgeon freedom to be at such locality as to permit him to 'Determine by close observation and appropriate clinical investigation the physical and psychological fitness of flight personnel.'

"The flight surgeon can contribute much to aviation safety by his presence on the flight deck at flight quarters and at other times. Indeed that area is his usual station for General Quarters. However, during flight quarters, it may be wise for the flight surgeon to be in the readyroom where pilots for the next launch are being briefed and are suiting up. He might wish to make a last-minute check on the physical condition of a specific pilot. He may be needed in the sick bay for surgery or emergency care. Finally, as often occurs on CVS carriers, flight operations can extend over many hours; it might be wise to have the flight surgeon rest and leave the first aid duties of the flight deck to a well trained hospitalman. Severe injuries usually require examination, electrolyte replacement, transfusion, anesthesia and surgery.

"The number of medical officers on a carrier is limited. Is it wise to so wear down a doctor by having him stand extended first aid watches on the flight deck as to make him ineffective when his services as a graduate of medicine are sorely needed? It is hard to conceive of any therapy, other than first aid, which could best be performed by a doctor on the flight deck. Finally all ships doctors must realize the heroism of releasing personnel from a burning or wrecked plane is not their privilege. That is the privilege and responsibility of men properly clothed and trained to do the job. It is the duty of a doctor to so protect his hands and arms as to be useful in performing the technical procedures that are expected of a graduate of medicine."

NASC comment. It is not always desirable to require the flight surgeon to remain on the flight deck during flight quarters. This should depend on the type of operations, length of the operating cycle and the number of flight surgeons attached to the ship. Those tempted to impose a rigid requirement should keep this in mind. The flight surgeon below decks is at most only about 1000 feet away when the crash alarm signals. ●

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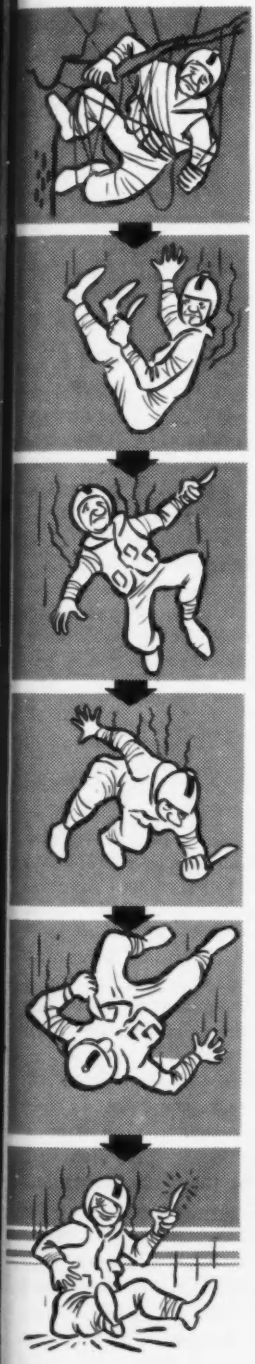
Your rescue knife can save your life in a variety of survival situations.



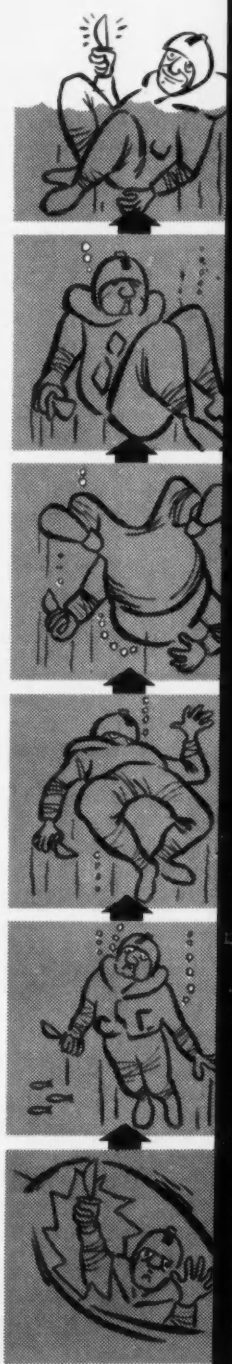
From TREE to shining SEA

● After ejection and parachute descent, an A4D-1 pilot found himself suspended in his chute harness 30 feet above ground between two trees. His chute canopy was caught in the top of a 60-foot pine. Seizing a limb, he swung over to a tree trunk. He had no trouble releasing the rocket jet fittings to the parachute canopy, but since he was unable to release the two leg-strap rocket jet fittings, he had to cut the seat pack straps with his survival knife before he could get free and climb down.

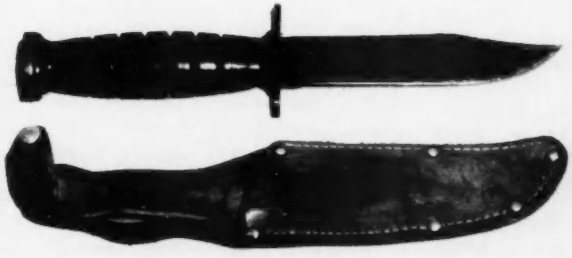
● Down South there's a safety and survival equipment officer named Anderson. He's sold on survival knives—Andy's knives his squadron calls them—and they have to be sharp. He keeps whetstones strategically placed around the squadron area. Andy's policy paid off in January: Shortly after takeoff, an F9F-8B being flown by one of the squadron pilots crashed and burned. While still airborne, the pilot had opened the canopy to clear the cockpit of smoke. After the initial impact but before the aircraft came to a stop, the canopy was forced partly closed . . . the pilot could not open it. In seconds, flames had reached the cockpit and the pilot's flight clothing was on fire. He got his head and body through the narrow opening but his chute pack hung up between cockpit and canopy. The heat was intense. The pilot unbuckled his leg straps to free himself from the chute pack but could not undo the chest strap. By this time, his left hand was so badly burned he could not use it and his right glove was burning. Grabbing his survival knife from its sheath—a knife razor-sharp thanks to Andy's whetstones—he sliced through the strap and jumped to safety.

● An F9F-8B was sinking rapidly into the sea. The pilot could not open the canopy. With his survival knife, he hacked an escape hole in the plexiglass, wiggled out, swam 15 feet up to the surface and a few seconds later was picked up by helicopter.

● A knife is an important survival item—do you have one?



SURVIVAL KNIFE AND SHEATH, 5" BLADE



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NOTES FROM YOUR FLIGHT SURGEON

Pilot Fueling

ADEQUATE pilot fueling is every bit as important as adequate aircraft fueling for safety in flight.

Investigation of an F3H-2N accident aboard a carrier showed that the pilot had missed breakfast. This fact, in itself, had no direct bearing on the accident. However, pilots' missing meals continues to be a problem.

The pilot, himself, was surprised when he realized that 17 hours had passed since his last real meal. He had slept too late for breakfast that morning. Between the time he got up at 0800 and the briefing in the readyroom at 0830, he had grabbed a cup of coffee and a couple of pieces of toast with jelly. A few hours later, the accident occurred.

One squadron in this same air group has adopted the official policy of grounding any pilot for the morning launches if he is unable to get up in time to make breakfast. If a pilot is too fatigued to get up a half hour earlier for breakfast, he is in no condition to fly an hour and a half later.

Supply Scoop

HERE'S some info on the status of a number of critical items of pilot's personal equipment:

Hardman Retention and Suspension Assemblies: 10,000 are on contract. As of the end of January, 7740 had been shipped to various supply activities. These kits come in three sizes: small, medium and large. The size you use depends on the size of your A13A oxygen mask. (See BACSEB 17-58)

Cutaway G-Suit (Z-3): 15,452 are on contract. The manufacturer has shipped 14,216 to Navy supply activities.

APH-5 Helmet: Even though the APH-5 helmet situation has improved slightly, rationing by fleet and training commands will have to be continued. The contract is for 22,000 helmets; 7000 have been shipped to various supply activities.

Three-Finger Turn-Up

DURING a flight-line turn-up of an S2F-1 at night, a maintenance crewmember inadvertently thrust his right hand into a revolving propeller. He suffered extensive injury to three fingers. The accident was set up when the man stood on the copilot's seat and leaned through the escape hatch to signal a lineman that he was about to actuate the torpedo door switch.

The flight surgeon on the case recommends that all squadron personnel be reminded repeatedly concerning the hazards of extending any portion of the body through aircraft escape hatches while engines are running.

Copter Rafts

A HUP-2 on an over-water training flight carried a PK-2 life raft wedged between two supporting frames of the fuselage behind the left-hand seat. When the plane collided with the water after materiel failure, the life raft was dislodged on impact and floated out of reach as the aircraft came to rest on its side.

Abandoning an attempt to retrieve the raft, the pilot and copilot climbed out of the sinking plane through the left pilot window, inflated their mae wests and jumped off into the water. Some time later, they were picked up by a motor launch from a nearby ship which had spotted their flares and dye marker.

This is the second accident in recent months in this particular

squadron in which a HUP-2's life raft has broken loose and become inaccessible to the men in the helicopter. As a result, the squadron is investigating the adequacy of the raft's mounting.

In another HUP-2 squadron, it is standard practice to carry the PK-2 raft (unattached for quick access in case of accident) under the jump seat.

The PK-2, a one-man life raft, has been an interim measure for the HUP-2. The PR-2, (Stock No. R4220-555-0785-LA20), is replacing the PK-2 in copter squadrons. As of the first of the year, 593 PR-2 life rafts had been shipped to various supply activities throughout the Navy. Another 635 were to be shipped during the latter part of January and the balance at a rate of 400 a month until the contract for 2,959 PR-2 life rafts has been completed.

Half Full

WHILE on plane guard duty, a HUP-2 experienced power failure and was ditched. Both the pilot and crewman escaped from the aircraft with no trouble and were subsequently picked up by another copter.

The pilot inflated both sides of his mae west. The crewman could only inflate the left side of his. Why? There was no CO_2 bottle in the right side.

Ed.'s Note: It is the responsibility of each individual to ascertain that all of his personal safety equipment is in the proper operating condition.

Morning After

A T-28C flipped over on its back in five feet of water after engine failure caused its pilot to make a controlled collision with the water in a bay near the airfield.

With coolness and presence of mind, the ensign quickly released himself from the seat although he was upside down. When he was unable to clear the aircraft with his parachute on, he took the chute off and went out through the port side of the open canopy. He surfaced, inflated his life jacket and walked to the shore some 80 feet away.

The night before the accident, the pilot swam the length of the naval air station pool under water.

Are you currently qualified in water survival techniques? Your type command has an instruction regarding these requirements.

Worth Quoting . . .

" . . . It is apparent that if all the personal background of the pilot's history contained in the AAR was known at the time of his cross-country request, it would not have been approved. Commanding officers and operations officers must be familiar with a pilot's background to the extent that they have confidence that the officer can perform his duties involving flying with safety."—*AAR*

" . . . and remember, flyboy, this here LCDR is worth three gallons of CHOCOLATE RIPPLE."

Shovels and Cranes

AN AD-4NA swerved on takeoff, ran off the left side of the runway onto rain-soaked soft earth, nosed up and over and came to rest inverted. The top of the cockpit was in contact with the mucky ground which sealed it off. The pilot was rescued uninjured after 21 minutes of digging by the crash crew. The crash crane was rendered ineffective by the muddy condition of the field.

There have been several similar instances over the past year or so. The flight surgeon reporting on this case strongly recommends that lifting equipment which can operate in sticky clay-like mud be made available for use in accidents of this kind. He also recommends that crash trucks carry spark-proof shovels. The imminent danger of fire was a "great worry" in this case because of the drainage of aviation fuel into the working area. (A spark-proof shovel made of copper is available in standard stock: nomenclature, Eastern Scoop, stock number G5120-250-4746, manufactured by Amco Metal Inc. of Milwaukee.)

Unarmed

IF THE pilot ejecting from an A4D-1 not too long ago had blacked out on the way down he wouldn't be around today. At 5000 feet when his rate of tumble began to increase he pulled the parachute D-ring. The chute deployed.

Later examination of the recovered automatic parachute actuating equipment showed the arming cable still attached and the release mechanism unarmed. The barometric release functioned perfectly when tested.

This was a case of human, not mechanical failure. The parachute arming cable was not correctly connected to the seat. ●

Young mechanics frequently assume that when they have found a bad spark plug they have discovered the cause of engine trouble. In many instances, however, a malfunctioning spark plug is the result of trouble, which if not corrected, will lead to the destructive failure of the engine. And often the spark plug furnishes the first clue to the basic difficulty. This important article interprets for us the warnings sounded by bad plugs.

Spark Plug Trouble

Courtesy of the United Air Lines Engineering Dept.

WE KNOW from experience that the greatest percentage of trouble in an internal combustion engine originates in the components of the combustion chamber. The spark plug is the only one of these components we can examine without too much difficulty. Since it is affected directly by everything that occurs inside the combustion chamber, we can accurately diagnose many combustion chamber troubles if we evaluate properly what the spark plug tells us.

Of course, such a message is of no value unless we (1) find it through careful inspection and (2) understand what it means. The purpose of this article is to define the things a spark plug can tell us about the irregularities originating within a combustion chamber.

Spark Plug Found Loose In Cylinder

A loose spark plug may be the effect of a much more serious condition. In the vast majority of cases a plug that is found loose was installed correctly and properly torqued. Its looseness indicates that for some reason the cylinder has been operating under a detonating or pre-igniting condition, which caused extremely high pressures and temperatures.

Therefore, a very careful inspection must be made for evidence of a collapsed exhaust valve head or a burned piston. In addition, a compression check should be made, and a very careful inspection of the cylinder head finning. Warped fins indicate a bulged cylinder head. The opposite spark plug, as well as the loose plug, should be inspected for signs of a failed nose ceramic. Such a condition in either plug will undoubtedly be the basic cause for pre-ignition during operation.

If a spark plug is left loose at installation, the effect can be the same as though it loosened in service. A loose plug will not cool properly, and during engine operation it will overheat to the point where the nose ceramic acts as a "glow-plug," causing pre-ignition in the cylinders. This means that any loose spark plug requires the inspections outlined in the preceding paragraph.

Mechanically Damaged or Peened Spark Plug Electrodes

See Figure 1.

Peened or mechanically damaged electrodes indicate that there are loose parts bouncing around inside the cylinder. Unfortunately, the fact that the electrodes are peened is not always readily apparent. The plugs may appear to be only badly oil-fouled. There are instances on record where clean plugs installed under such circumstances functioned properly until the engine failed because of foreign material in the cylinder.

Every oil-fouled spark plug should be inspected very carefully for damage to the center or ground

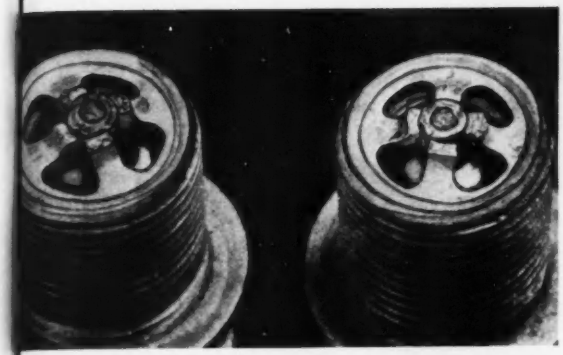


Figure 1—Typical mechanically damaged spark plug. Caused by failure of valve, piston or some component inside cylinder. In some cases, a foreign object enters cylinder through intake pipe. Requires investigation of source of foreign object and engine damage.

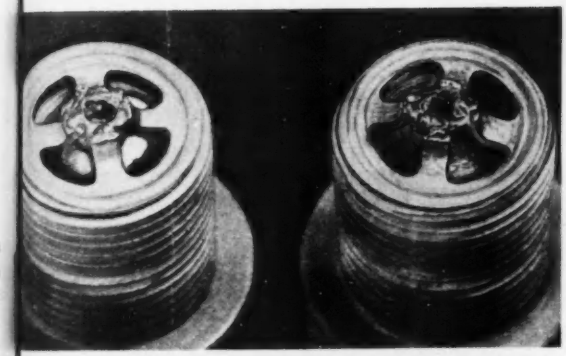


Figure 2—Typical fused spark plug—nose ceramics intact, copper melted out of center electrode and fused to outer electrodes grounding the plug. Minimum temperature 1800 degrees Fahrenheit. Generally caused by pre-ignition. Requires investigation of cylinder and piston for damage. Ignition mistiming and/or shorted primary wiring should be suspected.

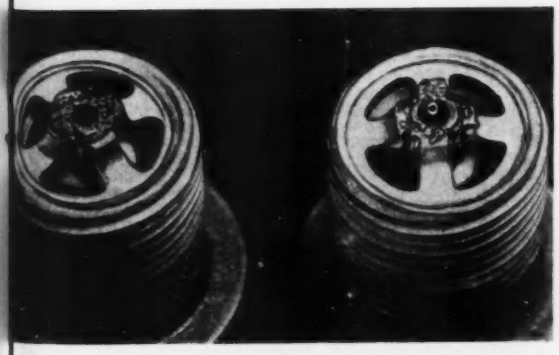


Figure 3—Typical fused spark plug caused by nose ceramic failure of plug on left. A broken nose ceramic will start pre-ignition. Requires investigation of cylinder and piston for damage.

electrodes. Where there is any doubt the plug should be washed and inspected again. Loose bolts, nuts, cotter pins, screws, washers, bits of pistons, piston rings, pieces of valves, blower parts and carburetor parts have shown up in cylinders during operation. In all cases the spark plug is the best indicator. Don't overlook the evidence.

Sprayed Metal Deposits on Nose Of Spark Plug

Where a serious failure has occurred, the metal plastered in the end of a spark plug is very obvious. However, incipient failures frequently release very little metal, and what we see with a "quickie" look appears to be a badly oil-fouled plug. Here again, a close inspection is required to determine if any metal is present.

If the metal spray is confined to one cylinder you can be certain of finding a burned piston. If there is metal spray in the spark plugs all around the engine expect to find a dragging blower impeller shedding aluminum dust.

There is a relatively rare type of exhaust valve failure that releases the metallic sodium from the valve head. This shows up either as a heavy powder deposit in the spark plug nose, or as metallic sodium.

Obviously, whenever metal spray is found in the spark plug nose, a very extensive check of the combustion chamber must be made to determine the cause.

Fused Center and Ground Electrodes

See Figures 2 and 3

Melted and fused spark plug electrodes indicate raised to the point where it ignites the charge of that the cylinder has been operating in pre-ignition. Pre-ignition can be caused by any component in the combustion chamber if its temperature is fuel early in the compression stroke. When this occurs the piston is forced over top dead center (TDC) against the exploding charge. There is probably no more destructive force developed in an aircraft engine than the pressures and temperatures resulting from this condition.

An abnormal deposit, a burned valve, or a failing piston can develop local hot spots that will cause pre-ignition. However, the most common cause is the failure of the spark plug nose ceramic. The broken piece of ceramic, trapped behind the ground electrodes, becomes heated to the critical temperature.

Another condition which has caused pre-ignition is the incorrect timing of an individual cylinder, due to crossed leads at the distributor plate. In this case the spark plug is fired far in advance

Continued from preceding page

Figure 4—Typical highly eroded spark plug caused by high head temperature, advancing timing or improper mixture. Heat in cylinder near the point of pre-ignition and/or detonation requires investigation of ignition timing, and inspection of cylinder condition.

of normal timing, creating a condition identical to that of the broken ceramic.

There have been occasional cases where a nose ceramic has failed, the cylinder has operated in pre-ignition, fusing the plug and back firing. A momentary reduction of the throttle then stopped the pre-ignition and the engine operated relatively normally, with the particular cylinder dead due to the shorted plugs. After a limited amount of operation these plugs appeared badly oil-fouled, and it was difficult to detect the fused condition. Where new plugs were installed the badly damaged cylinder and piston later failed.

Again, mechanics must be extremely suspicious of any oil-fouled spark plug. In any case of fused electrodes the cylinder and piston must be inspected very carefully for evidence of damage.

Badly Eroded Center Electrodes

See Figure 4.

This type of erosion is most apparent by the loss of the copper core from the nose of the center electrode. The gaps of the plug are wide, with definite thinning of the ground electrode. Usually this condition appears in varying degrees through the entire set of spark plugs. It indicates an overheat condition of serious proportions.

Advanced ignition timing should be suspected, and the possibility of abnormally lean carburetor flows during high powered operations. If copper run out is noted all of the combustion chambers should be carefully checked for damage. The timing and the compression also should be checked, and the carburetor and ADI system considered as possible sources of the trouble.

Fuel Fouling

See Figure 5.

Soft, fluffy and dry black carbon deposits mean a too rich fuel-air mixture. This may be due to excessive idling or faulty carburetor adjustment.

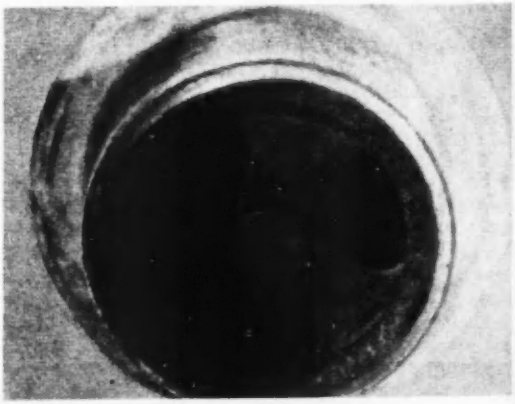


Figure 5

Lead Fouling

See Figure 6.

Lead oxide and other lead salts may appear as a film or fluffy coating or as a dark colored glaze. These compounds have little effect on the performance of a plug at low speed operation, but at high speeds and high loads and high temperatures they form good electrical conductors which tend to short

out the plug. Plugs that are severely fouled with lead salts deposits should be discarded.

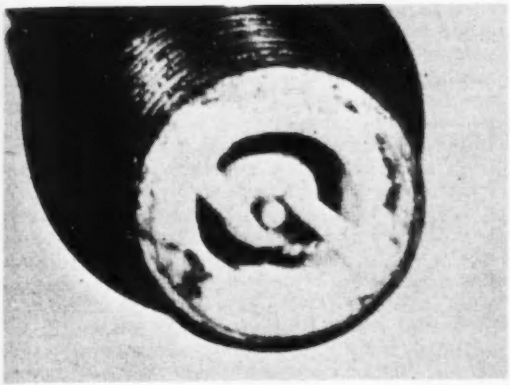


Figure 6

Oil-Fouled Spark Plugs

Much has already been said concerning oil-fouled spark plugs and the necessity to examine them carefully for damage of one kind or another. It is true that where only one spark plug in a cylinder is fouled, it is usually a simple case of fouling. The black, wet deposits that cause a miss even at reduced engine output may be only a normal oil accumulation common for the lower cylinders. However, when both the spark plugs removed from a single cylinder are found to be badly fouled with oil and carbon, some form of mechanical failure should always be suspected, and the cylinder checked accordingly.

The history of the engine also should be considered. Certain models have experienced what might be termed chronic failure of the upper land of the pistons. On one model oil-fouling of both spark plugs in the same cylinder can be taken as the announcement of a valve failure.

Summary

The summary of this article can be short. Be extremely suspicious in any case where both spark plugs are dead in a cylinder. The chances are you are looking at something much more serious than spark plug trouble. ●

WHEELS-UP SAVES

Name	Station	Acft	Date
Brecheen, J. H. Jr., AC2	NAS Dallas	F8U	11-25-58
Rose, W. L., AN	NAS Barbers Pt.	F9F-8	11-17-58
Lt. M. A. Eckhouse, USN	NAS Willow Grove	FJ-3	12-20-58
Nelson, T. O., AN	NAAS Whiting	T-34	11-13-58
Capt. R. D. Pendergraft, USMC	NAAS El Centro	F8U-1	11-24-58
Arthur, M. S., ADR3	NAS New Orleans	C-119	11-15-58
Black, C. A., AC1	NAS Cecil Field	A4D-2	12-19-58
Dunphy, H. M., AC1 Horton, H. D., AO3 Morrison, J. L., AC3	NAS Whidbey Island	A3D	11-25-58
Carter, R. B., AC1	NAS Memphis	F9F-6	12-21-58
Depolito, P. T. Jr., AA	NAS Oceana	AD-6	1-5-59
Watters, C., AN	NAAS Brown	AD	1-8-59

Paddles Problems

The color and location of the "paddles" on the runway watch was brought up. The present color is yellow and blends in with the yellow vehicles plus the light area background. They will be immediately changed to red. A platform for the runway watch was suggested, one with a bright red background and the "paddles" of yellow color to clearly set forth the position of the paddles. With the present system, "paddles" is lost in the background.

Solution

The runway wheels watch paddles have been replaced with bright red in lieu of yellow. The red paddles have been reported as being more visible, as the yellow paddles blended in with yellow vehicles plus the light area background.—Southern, Key West

FROM THE GROUND UP

AFTERBURNER RUNAWAY

Two mechanics turned up an F4D-1 in order to bleed the brakes. Normal prestarting procedures were completed and the start was normal with the exception of RPM which continued to increase above the idle RPM of 65%. Upon noting the rise in RPM the mechanic in the cockpit attempted to shut down the engine by moving the throttle outboard and to the rear. The afterburner was unintentionally engaged, the aircraft jumped the chocks and moved forward striking a TUD-80

mule. The mechanic then shut off the engine master switch and battery switch and abandoned the aircraft.

Upon contact with the TUD-80, the starboard tank was ruptured and immediately exploded and burned. Fuel from the drop tank spread rapidly underneath the aircraft and flames spread over the entire aircraft. Strike damage resulted. (See photo left).

Another F4D was parked in close proximity to the burning aircraft and the fuel from the ruptured drop tank flowed under the nose section of this aircraft before it could be moved. The nose section of the aircraft was severely damaged by fire before the fire was extinguished by the crash crew.

The first endorser of the FLIGA report noted the following:

This aircraft was not tied down in accordance with OpNav Publication 34P1, paragraph 03203, subparagraph 8, page 347. Notwithstanding this fact, no available tie-down would have prevented this accident since the afterburner was inadvertently engaged. However, available tie-downs will prevent similar occurrences if an engine experiences an uncontrolled acceleration after starting and the afterburner is not engaged.

The manner in which personnel moved other aircraft away from the burning aircraft is commendable. Such movement amid an explosion, flying debris, intense heat, and danger of other explosions was hampered by adjacent aircraft beind tied down.

It was directed that unit commanders assigned aircraft equipped with afterburner will perform the following:

Conduct a continuing educational program for appropriate non-flying personnel on the subjects of aircraft starting and aircraft ground handling procedures. Designate in writing such personnel who are considered qualified. Thoroughly retest the qualifications of designated personnel monthly and revoke designations if they do not meet proper requirements.

Aircraft will be towed to only designated turn-up areas for high power turn-ups.

Where aircraft, on the flight line, are to be started, the adjacent aircraft will be untied.

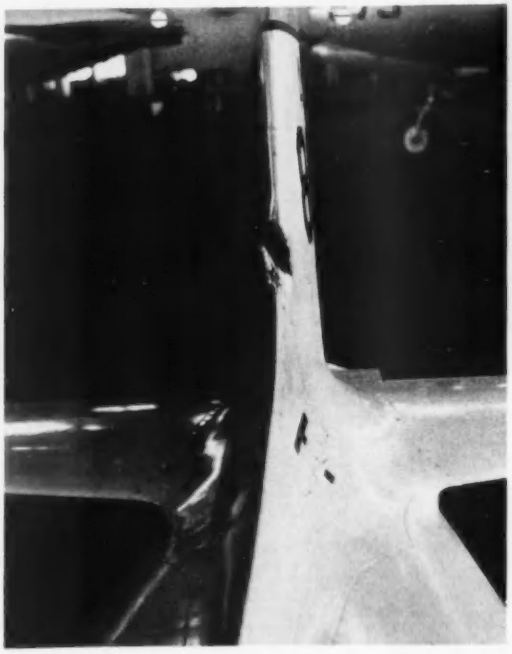
Please turn page

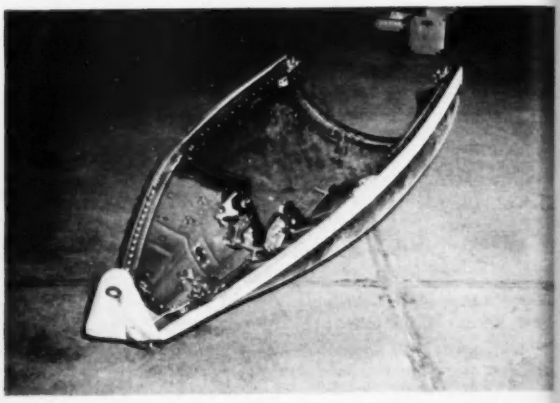
TIP-TANK PROTECTION

To reduce a tip-tank damage during refueling operations an 8 x 16 x ¼ inch leather pad laced to the fuel hose and nozzle has proved most satisfactory.

Contributed by NAS, Corpus Christi

Continued from preceding page





The canopy above was fired accidentally when mechanics tried to install it without the safety pins being in place; tail assembly, left, was also damaged as a result.

SAFETY PIN RULES FOR TV—Four maintenance men were replacing the canopy of a TV-1. While attempting to reinstall the canopy without safety pins in place. The canopy was fired by accidental tripping of the canopy jettison trip arm when inserting the canopy in the canopy roller track. The canopy fired after striking the upper fuselage, vertical stabilizer and horizontal stabilizer, and landed on the hangar deck 30 feet from the cockpit where it came to rest.

None of the men working on the aircraft made any attempt to ascertain that safety pins were in place. No individual assumed any particular man was in charge at the scene. The plane captain is responsible for inserting safety pins on seat and canopy mechanisms whenever the aircraft is on the ground. None were inserted. The plane captain assumed that since no safety pins came with the aircraft that none were available. He therefore failed to notify his superiors of the situation.

To prevent a recurrence of this situation, says the reporting unit, the following action is to be taken:

A special maintenance board will be hung from the starboard wheel well on all jet aircraft. In addition to listing the particular maintenance work required on the aircraft, there is a space provided on the board for checking off safety items. Prior to any work being done on the aircraft, the plane captain is required to sign off three entries on this board to the effect that landing gear safety pins, ejection seat safety pins and canopy safety pins have been installed. Ordnance personnel shall indicate on the board that all guns have been cleared.

When a jet aircraft is returned to the line with intention for further flight without maintenance being required, another check will be established. The plane captain places a placard bearing a red flag on the headrest in the cockpit. This placard will bear the notation "Ejection seat and canopy safety pins installed." This placard will be placed on the headrest after the safety pins are in place.

NEW CHOCKS COMING—The plane captain was conducting an engine preflight run-up on an S2F-1, which was tied down with six single hemp lines with a combination lumber-hemp line chock on each of the main gears.

As the MAP on the starboard engine was advanced to 30 inches the aircraft pivoted rapidly to the left about the port wheel, completing a 180-degree turn and struck the port wing butt of another S2F-1 parked about five feet away.

The plane captain did not put the parking brake on prior to starting the engines and failed to utilize the brake pedals at any time.

The starboard chock (combination lumber-hemp) came out as the starboard throttle was advanced, permitting the aircraft to lurch forward snapping the tie-downs as it pivoted.

Use of the combination lumber-hemp chocks has been discontinued.

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BuAer states the use of the line-secured type chock involved in this accident is not an approved type. New improved metal adjustable chocks for shore activities and carriers will soon become available in supply.

TAIL TROUBLE — Two mechanics were assigned the task of installing a reworked engine in an F9F-8B which had been previously removed from the aircraft. When the engine was previously removed from said aircraft, due to hangar space, the aft section (with no engine in the forward section) was reinstalled and the aircraft was parked on the line.

In the process of removing the aft section of the aircraft, difficulties were encountered by the maintenance crew. After placing the cradle under the aircraft and removing the aft section retaining nuts, attempts were made to disconnect the two sections sufficiently to fasten the cradle securing hook around the lower keel bolt. Due to the tight fit of the two sections, the crew was unable, initially, to break the aft section loose. Extra force was required to disconnect the tail section.

When sufficient force was applied the aft section of the aircraft broke abruptly away from the forward section. The crew was unable to secure the cradle hook around the aft section lower keel bolt, thereby, allowing the tail section, which is tail heavy by design, to topple. The lower rudder, both elevator tips, and a gas vent fitting sustained limited damage.

Primary cause of the accident was the removal of all aft section retaining nuts before securing the cradle to tail section keel bolt.

Secondary cause of accident—Under normal conditions the forward and aft sections could have been separated up to five inches before the tail section could have possibly toppled. In this instance extra force had to be applied to separate the two sections because of a tight fit and when separation occurred five inches were exceeded causing a chain of incidents which could not be controlled by maintenance crew.

Recommendations:

► The lower tail keel securing nut be left on at least three full threads until the tail has been broken loose and the tail removing cradle hook is secured around tail keel bolt.

► Before detaching aft section from forward section of an F9F aircraft *(with no engine installed in forward section)*, 200 pounds of sand bags be placed in forward part of tail section for ballast.

FILLER HOSE SUPPORT—Reports of liquid oxygen leakage around the filler valve have been received. The reporting activity stated that, in all cases of leakage, the red rubber O-ring in the filler valve was unseated and protruding from its recess, thus allowing liquid oxygen to escape.

It is believed that the reported conditions are caused by the weight of the filler hose hanging on the valve during servicing operations.

It is recommended that the filler hose be adequately supported during servicing and that no undue stress be applied on the filler valve or line during filling, particularly while the components are cold.—A wood block can be used as an alternate method of supporting the hose.—*NAA Service News*

CHIP DETECTOR SAVES—A recent survey of possible saves due to the use of the magnetic chip detectors shows 21 saves for the Air Force and 8 for the Navy.

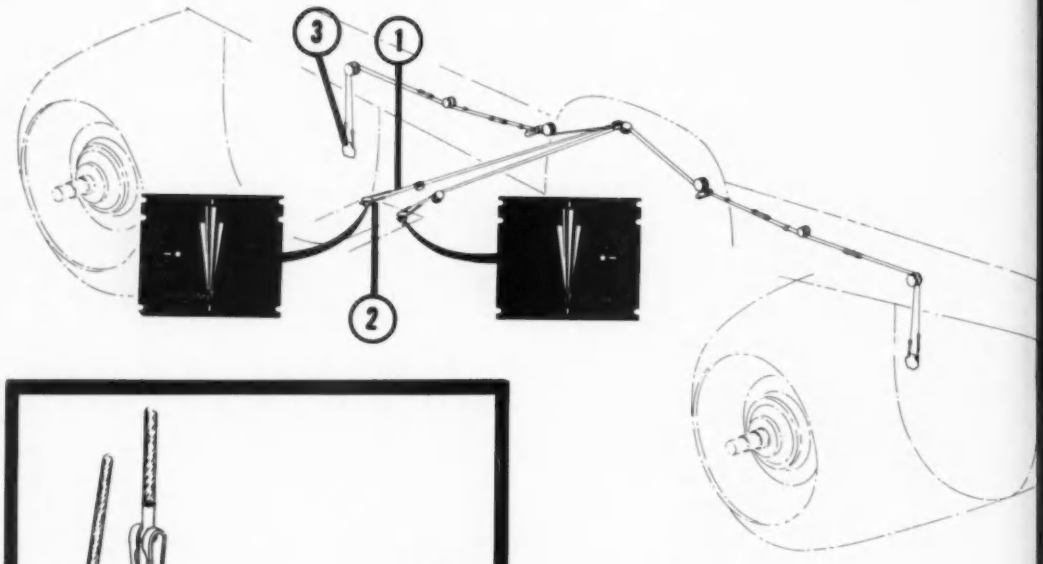
HOT WHEEL BLOW—Fire and explosion occurred after an FJ-4B was taxied into the flight line with hot wheels after aborting take off. The tires blew and the exploding port wheel went through a full drop tank causing a fire which spread to adjacent aircraft. Strike damage resulted. There were no injuries. *See "Monitor," inside back cover.*

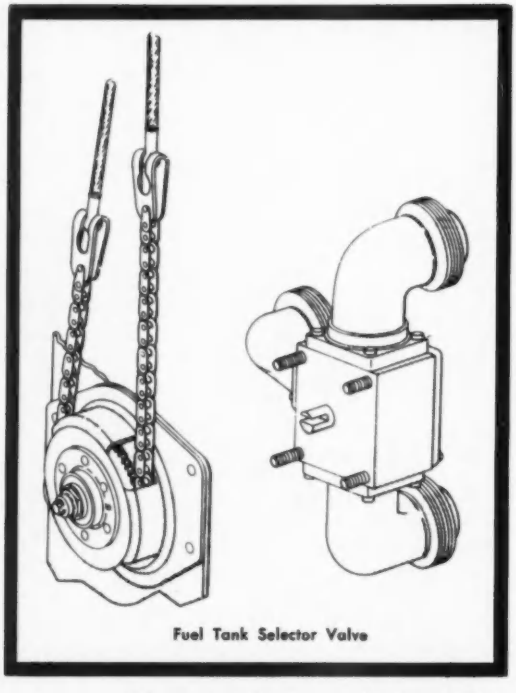
PROFESSIONAL APPROACH—The logbook entry read: "Left battery dead." Some men would have installed a fully charged battery and signed off the work sheet, but not this mechanic who was assigned to this job.

He had the professional approach. He wanted to know why the battery was dead and what the implications were, so he looked farther. He found that the battery was bulged, one cell was melted and all the filler caps destroyed. The trouble had been caused by the failure of the battery receptacle insulator. This permitted the battery interconnecting cable to drop down and short out the battery.

This professional approach, this insistence on learning the cause of a difficulty and fixing it as well as the difficulty itself, is the mark of a good mechanic and the strength of aviation.—*1st MAW Wingtips* ●

MURPHY'S LAW*





Fuel Tank Selector Valve

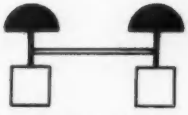
DOUBLE MURPHY

The right-hand fuel selector handle cables (1) were crossed and handle (2) was replaced 90 degrees out of phase with the fuel selector valve (3) in the nacelle . . .

* If an aircraft part can be installed incorrectly, someone will install it that way!

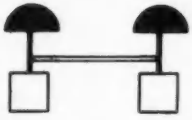
While making practice ASR approaches in an S2F at night the

selected RIGHT TANK to RIGHT ENGINE and LEFT TANK to

LEFT ENGINE. He expected fuel to flow like this: 

But it flowed like this then selected RIGHT TANK

to BOTH ENGINES expecting this Instead,

the got this  Next selected LEFT TANK

to BOTH ENGINES and got this

The selector cable had been and the

had been replaced out of phase with the fuel tank

selector in the nacelle.

The following events and circumstances permitted this Murphy to occur:

Two ATs had removed several panels of the overhead console to remove the ARN-6 cable. One of three panels was the fuel selector of the right tank. When the squadron secured, these men left the cable partially removed and the control boxes on the deck! On night check two other men replaced the panels with the exception of the fuel selector. A mech was sent to reinstall the fuel selector handle. The aircraft was okayed after a short turn-up.

It was recommended that:

(1) A visual check always be made for proper cable installation and that handles and valves are synchronized.

(2) Work of this nature be inspected by a person other than the one.

A short turn-up, as happened in this case, doesn't prove the selectors are rigged right.—*Contributed by* LT V. E. WILSON, VS-36

Clipboard

Mayday

A SAR Bulletin discussed an incident in which an R4D made a Mayday call, reported he was at 1200' with both engines out and — quite superfluously — that he was making an emergency landing. When a SAR net station came on and asked his position, the pilot replied that he was too busy to talk, and that he was going to "belly her in."

No one disputes that the man was indeed busy, but his wisdom in withholding his position — while consuming precious time justifying his decision on the air—is open to question. Even a terse "Over Podunk" or "west of Squeedunk" would have been helpful — and shorter than the message actually sent. Help in this case could be initiated only after some reasonable determination of the distressed plane's location. Reminds one of the Duke of Wellington who appended the following postscript to a battle communique: "I regret, my lords, that I did not have time to make this message shorter."

Passing Thru 24,000'?

ON 15 January 1959 flights above 24,000 feet MSL commenced using the standard altimeter setting, 29.92" HQ. This brought into focus the expression "Flight Level" which has been used in transoceanic flying for years but is probably new to many pilots. For information on altimeter settings and flight levels, break out the Flight Planning Document: select Section III, International Rules and Procedures (corrected to 25 June 1958) and turn to page 38 . . . When you've finished studying the material, sit down and say to yourself 20 times, "I will not forget to change my altimeter setting when passing through 24,000 feet."—*2d MAW*

Call Card

HOW many times have you tried to draw an item of flight clothing only to be told that the item is not in stock but is "expected soon?" You try again in two weeks and find that it's still not in stock . . . But, something has happened of which you are unaware: During the two weeks between your attempts, six of the item came in and six other guys exhausted the stock; leaving you out "in the cold" . . . The Supply Officer has instituted a new practice . . . From now on when you are told that an item is temporarily out of stock, ask the Flight Clothing Section to prepare a "Call Card" for you. When the item arrives they'll give you a phone call and hold the material for you for five working days. After that it goes to the next fella . . . —*2nd MAW, Cherry Point*

Hot Line

WHEN one engine of a multi-engine jet is being runup, the only indication as to which engine is running is the heat being exhausted. Do you have procedures set up to train your personnel in this phase, especially during night and inclement weather operations? —*Nat'l Safety Council News Letter*

Control of Runaway Prop

WE HAVE had four or five instances of runaway propellers. Two of these resulted in engine accessory case fires which appeared to be caused by the engine supercharger impeller wheel stretching from its exceedingly high RPM. When the engine is operating in high blower, this results in a runaway prop. This stretch damaged the magnesium accessory section case with high heat and oil leakage which resulted in fire.

For this reason, our emergency procedures covering runaway propellers include immediate shifting of the engine supercharger from high to low blower if operation is being conducted in high blower at the time of the runaway. While we cannot say that such a procedure is a guaranteed cure-all in preventing fire, we do feel that by so doing and cutting the RPM of the supercharger impeller to as low a value as possible, we are taking a step in the right direction.—*"Technical Talk for Pilots 58-15," ALPA*

Answers to Quiz, page 15

1. See Section IV, para. 1c(3) of OpNav Inst 3720.2A—you might be one of those affected.

2. They're on the NIGHT FLARE end—and when you pop the flare, for gosh sakes don't look down the barrel if it doesn't start blazing right away!

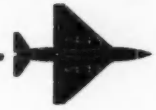
3. According to OpNavInst 3750.6C it's an Incident, as your aircraft (the only one which had intent for flight) suffered less than "D" damage. If the same tank had destroyed your aircraft, it would have to be reported as an Aircraft Accident.

4. There's no official signal, but if you hold up your clenched fists (the signal for brakes) followed by a "thumbs down," or by shaking your head to signify "no," he just might latch on; if he doesn't, find another wingman.

5. Underboost (high RPM with low MAP) imposes high centrifugal forces on the pistons and their components — they're "thrown" out to the end of their stroke with insufficient manifold pressure to "cushion" the force at TDC. This imposes loads that the engine wasn't designed for. Wright Aero recommends at least 1" Hg for each 100 rpm to avoid underboost during descents from high altitudes.

monitor

EXCERPTS FROM SOME OF THE NAVY'S SAFETY COUNCILS THROUGHOUT THE WORLD, WHO PROVIDE LOCAL LEADERSHIP AND EMPHASIS TO THE NAVAL AVIATION SAFETY PROGRAM.



Hot Wheels

All squadron maintenance officers in this command were made aware of this accident and the subsequent incident involving a post-flight wheel explosion (See "Hot Wheel Blow," page 37) and separation on an FJ model aircraft. They were directed to warn all maintenance personnel to keep clear of the main landing gear on FJ model aircraft for at least 15 minutes after return of flight line.—*3rd MAW*

Check the Check-off

The need for reviewing the aircraft check-off cards was discussed and it was pointed out that each time a pilot's flight manual revision is received the check-off card must be reviewed for possible corrections.—*VRF-32*

Standard

It was mentioned that no standard terminology was being used to indicate amount of fuel remaining. It was recommended that all pilots give remaining fuel in minutes that they can hold at their present altitude and still make a safe approach to a landing.—*3rd MAW*

Driver Quals

Our efforts in stopping vehicular ground accidents are paying dividends. However some vehicle drivers are not being checked out in the vehicles they are driving. A Navy driver's license can be worthless if the driver can not properly operate his vehicle. Action should be instigated by squadron commanders to ensure that drivers are properly instructed.—*FAir Alameda*

Switch OFF

There is a hot wire in the wing of the T-28 which is live when the battery switch is ON. In case of a crash where the fuel cells rupture, this wire could possibly be a source of fuel ignition. Emergency procedures in the Manual state to turn the BATT Switch OFF prior to impact.—*NABaTraCom*

THIS ISSUE

- O-Club Saturday Night
- Wet Dry Run
- Spinning
- Keep the Pressure On
- Spark Plug Trouble
- Going to be Arrested?
- Murphy's Law

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